0075

CO-OP MINING COMPANY
ANNUAL REPORT 1993

Bear Canyon Mine
ACT/015/025

Trail Canyon Mine
ACT/015/021

Prepared by

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for

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Co-Op Mining Company
Annual Report for 1993
Bear Canyon and Trail Canyon Mines

SCOPE

The following document contains information pertaining to Co-Op Mining Companies Bear Canyon and Trail Canyon Mines. Bear Canyon Mine is an active mine, under current production. Coal mining production was terminated in 1981 at Trail Canyon Mine and the mine has undergone extensive reclamation. Trail Canyon Mine remains under the required bond liability period.

This report was compiled based on the "annual report information sheet" received from the Division of Oil Gas and Mining(1992).

ANNUAL REPORT INFORMATION SHEET

COAL MINING AND RECLAMATION OPERATIONS FOR 1993

Permittee:	Co-Op Mining Company
Mine Name:	Bear Canyon Mine / Trail Canyon Mine
Mailing Address:	53 West Angelo Avenue Salt Lake City, Utah 84115
Company Representative:	Kimly C. Mangum, P.E., M.E.C.
Resident Agent:	Mr. Wendell Owen Co-Op Mining Co. P.O. Box 1245 Huntington, Utah 84528
Permit Number:	Bear Canyon Mine - ACT/015/025 Trail Canyon Mine - ACT/015/021
MSHA ID Number:	Bear Canyon Mine - MSHA #42-00081-0
Date of Initial Permanent Program Permit:	Bear Canyon Mine - Nov. 1, 1985 Trail Canyon Mine - May 30, 1989
Date of Permit Renewal:	Bear Canyon Mine - May 20, 1991 Trail Canyon Mine - May 30, 1989
Quantity of Coal Mined (tonnage) 1993:	459,800 short tons

Updated Mine Sequence Maps are attached.

WATER MONITORING

All water monitoring data for 1993 has been submitted to the Division quarterly. Copies of the 1993 water monitoring matrix showing monitoring point locations and monitoring frequencies for the Bear Canyon and Trail Canyon Mines can be found in Tables 1 and 2. Copies of the summary pages are included in Appendix A and as database files (enclosed).

U.P.D.E.S. Discharge Permit

No water was discharged in 1993 at points 001 (Trail Canyon Mine Sediment Pond), 002 (Bear Canyon Mine Sediment Pond A), 003 (Bear Canyon Mine Sediment Pond B), or 006 (Bear Canyon Mine Sediment Pond C). Summary of discharge monitoring is found in Appendix A for discharge point 004 (Portal-Underground Seepage Water Overflow). No monitoring of discharge point 005 (Bear Canyon Culinary System Overflow) is required. A copy of Co-Op Mining Company's permit number UTG040006, Utah General Permit for Coal Mining can be found as Appendix 7-B of the Bear Canyon Mine PAP.

Underground Mine Water Survey

Copies of the 1993 Mine Water Survey can be found in the Appendix (MAPS) of this report. Flow from the two main sources within the mine (SBC-9 and SBC-10) was measured using controlled pumping with in-line flow meters. Flow at SBC-10 has decreased from 185 gpm in the first quarter to 28 gpm in the forth. Flow decreased as the 1st North Mains in the area of SBC-9 were mined to the north. Some modification to water at sumps are noted in the survey.

Drill hole DH-3 was eliminated when mining made the location inacessable in the forth quarter. A new drill hole DH-4 will replace DH-3 in the first quarter of 1994.

Bear Canyon Water Monitoring Matrix 1993

Location	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Upper Bear Creek BC-1		oper.			oper.	field	field	oper.	field	oper.		
Lower Bear Creek BC-2		oper.			oper.	field	field	oper.	field	oper.		
Rt Fork Bear Cr. BC-3		oper.			oper.	field	field	oper.	field	oper.		
Creek Well SBC-3		oper.			oper.			oper.		oper.		
Huntington Spr.[3,4] SBC-4		base.			base.			base.		base.		
Birch Spring[3,4] SBC-5		base.			base.			base.		base.		
Co-Op Dev Spring SBC-6		oper.			oper.			oper.		oper		
1st N. Bleeder #42 SBC-9		oper.			oper.			oper.		oper.		
2nd E. Bleeder #3 SBC-10		oper.			oper.			oper.		oper.		
2nd W Mon. Well[4] DH-1A	level	base	Level	Level	base	Level	Level	base	Level	base		
3rd w Mon Well[4] DH-2	Level	base	Level	Level	base	Level	Level	base	Level	base		
1st E Mon.Well[4] DH-3	Level	base	Level	Level	base	Level	Level	base	Level	base		

Notes: See Tables 7.1-7 and 7.2-5 of the MRP for listing of water quality monitoring parameters. oper. = operational
base. = baseline
SBC-4 and SBC-5 shall also be tested for oil and grease.

Trail Canyon Water Monitoring Matrix 1993

Location	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Upper Trail Cr. UT-1					oper.					oper.		
Lower Trail Cr. LT-1					oper.					oper.		
Portal Spring PS-1					oper.					oper.		
Trail Canyon Spring TS-1					oper.					oper.		
Co-Op Spring CS-1					oper.					oper.		
Ball Park Spring BP-1					oper.					oper.		
Birch Spring SBC-5	base.					base.	base.	base.	base.	base.	base.	base.
Sed. Pond Inlet SP-1					oper.					oper.		
Culvert TCC-6 Outlet CO-1				See	Note	#4						
Sealed Mine Entries and Access				See	Note	#5						

Notes: 1. Taken from Table 7.2-7 of the PAP. See Tables 7.2-5 and 7.2-6 of the PAP for listing of water quality monitoring parameters.

2. oper. = operational, base. = baseline
3. Baseline parameters to be taken in **1993** at all locations.
4. Sampling will occur during storm events or spring runoff at outlet to culvert TCC-6 when flows occur and tested for oper.
5. Unplanned discharges will be sampled on a quarterly basis until bond release.

CLIMATOLOGICAL DATA

A total of 8.53 inches of precipitation were measured at the Bear Canyon Precipitation Gauge during 1993, 11.21 inches were measured in Trail Canyon. Rain gauge monitoring data is summarized in Appendix B and as database files (enclosed).

SUBSIDENCE MONITORING

A monitoring network was installed in the summer of 1987, and has been monitored since that time. Monitoring stations are steel rebar with aluminum caps, set in concrete so weather, frost heave or wildstock/wildlife will not disturb them.

Ten permanent subsidence monitoring points (SMS-1 thru SMS-5, Con 6, and SMS-7 thru SMS-10) are located on the mine site area. SMS-1, SMS-3, and SMS-4 are common to both the Trail Canyon and Bear Canyon Permits. CON-6 and SMS-7 thru SMS-10 were established 22 September 1991.

Subsidence monitoring was performed in 1993 using the professional services of Blackhawk Engineering. The results of the survey are found in Appendix C. Monitoring locations are located on Plate 3-3, see Appendix Maps.

VEGETATION MONITORING

Vegetation monitoring was performed in 1993 using the professional services of Mt. Nebo Scientific Research & Consulting. The results of the survey are found in Appendix D.

ANNUAL IMPOUNDMENT INSPECTION

Copies of the Annual Sediment Pond Inspection Reports are attached with this report in Appendix E.

ANNUAL REPORT OF OFFICERS

A copy of the Profit Corporation Annual Report for C.W. Mining Company is included in Appendix F.

PERMIT STIPULATION STATUS

There are no open stipulations from the latest permit renewals.

APPENDIX A
WATER MONITORING DATA

BEAR CANYON MINE
1993

WATER MONITORING DATA

WATER MONITORING REPORT

Property: Co-op
Station: BC-1
Location: Upper Bear
Type: Stream
Frequency: Quarterly - Field: June, July Sept.

Field Measurements	Date Sampled 2/15/93	5/19/93	6/11/93	7/31/93	8/11/93	9/24/93	10/20/93
Sampled By:	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.
Flow (gpm)	Dry	320	214	53	210	72	32
pH	N/A	8.09	8.3	8.41	7.98	7.33	7.9
Sp. Cond. (ohms)	N/A	805	645	648	717	770	785
Temp (C)	N/A	6.5	11.9	16.9	8.9	7.8	8
Diss. O. (ppm)	N/A	5.0	5.5	5.0	5.4	5.2	5.5

Lab Measurements							
Analyzed by:	N/A	CT&E	N/A	N/A	CT&E	N/A	CT&E
Settleable Solids		95.0			N/D		0.8
Suspended Solids		37,940			551		197
Dissolved Solids		496			414		419
Hardness (CaCO3)		873			367		588
Acidity (CaCO3)		N/D			N/D		N/D
Carbonate (CO3)		N/D			N/D		N/D
Bicarbonate (HCO3)		242			256		376
Calcium (Ca)		113			66		120
Chloride (Cl)		13.8			7.9		5
Iron (Fe)		38.5			5.7		1.7
Magnesium (Mg)		143.4			49		70
Manganese (Mn)		3.4			0.13		0.2
Potassium (K)		18.8			5		N/D
Sodium (Na)		12.9			8.5		16
Sulfate (SO4)		800			100		210
Oil & Grease		0.9			0.2		N/D
Cations		18.45			7.81		12.4
Anions		21.07			6.42		10.6
Cation/Anion Balance (%)		-9.84			9.82		8.1

WATER MONITORING REPORT

Property: Co-op
Station: BC-2
Location: Lower Bear
Type: Stream
Frequency: Quarterly - Field: June, July Sept.

Field Measurements	Date Sampled 2/15/93	5/19/93	6/11/93	7/31/93	8/16/93	9/24/93	10/21/93
Sampled by:	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.
Flow (gpm)	305	403	278	557	190	310	123
pH	7.35	8.04	8.03	8.09	8.16	7.64	7.5
Sp. Cond. (ohms)	588	780	584	587	668	618	680
Temp (C)	6.28	8.2	11.8	14.5	8.6	10.5	9.9
Diss. O. (ppm)	5.6	6.3	5.6	5.6	5.9	5.1	5.6

Lab Measurements							
Analyzed by:	CT&E	CT&E	N/A	N/A	CT&E	N/A	CT&E
Settleable Solids	0.0	50			N/D		N/D
Suspended Solids	7.0	13,110			30		56
Dissolved Solids	284	430			348		318
Hardness (CaCO3)	289	869			247		315
Acidity (CaCO3)	2.0	0.0			N/D		N/D
Carbonate (CO3)	0.0	0.0			N/D		N/D
Bicarbonate (HCO3)	301	242			228		342
Calcium (Ca)	63	79.2			49.5		65
Chloride (Cl)	0.6	6.5			4.7		6
Iron (Fe)	0.27	30.2			0.76		N/D
Magnesium (Mg)	32	163.1			30		37
Manganese (Mn)	0.0	2.9			0.03		0.2
Potassium (K)	0.0	13.8			3		N/D
Sodium (Na)	4.2	12.8			6.3		10
Sulfate (SO4)	40	800			130		60
Oil & Grease	0.5	1.4			0.1		N/D
Cations	5.95	18.24			5.28		6.7
Anions	5.67	20.86			6.51		6.9
Cation/Anion Balance (%)	2.43	-6.67			-1.64		-1.4

WATER MONITORING REPORT

Property:	Co-op
Station:	BC-3
Location:	Right Fork
Type:	Stream
Frequency:	Quarterly - Field: June, July Sept.

Field Measurements	Date Sampled 2/15/93	5/19/93	6/11/93	7/31/93	8/16/93	9/24/93	10/20/93
Sampled by:	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.
Flow (gpm)	Dry	Dry	Dry	Dry	Dry	Dry	Dry
pH	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sp. Cond. (ohms)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Temp (C)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Diss. O. (ppm)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Lab Measurements							
Analyzed by:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Settleable Solids							
Suspended Solids							
Dissolved Solids							
Hardness (CaCO3)							
Acidity (CaCO3)							
Carbonate (CO3)							
Bicarbonate (HCO3)							
Calcium (Ca)							
Chloride (Cl)							
Iron (Fe)							
Magnesium (Mg)							
Manganese (Mn)							
Potassium (K)							
Sodium (Na)							
Sulfate (SO4)							
Oil & Grease							
Cations							
Anions							
Cation/Anion Balance (%)							

WATER MONITORING REPORT

Property:	Co-op
Station:	SBC-3
Location:	Rt. Fork Well
Type:	Well
Frequency:	Quarterly

Field Measurements	Date Sampled 2/05/93	5/27/93	8/16/93	10/25/93
Sampled by:	M.E.C.	M.E.C.	M.E.C.	M.E.C.
Depth (FS)	Dry	18.75	28	35
pH	N/A	6.88	7.18	7.23
Sp. Cond. (ohms)	N/A	2980	4000	3967
Temp (C)	N/A	12.5	7.9	9.3

Lab Measurements				
Analyzed by:	N/A	CT&E	CT&E	CT&E
TDS (mg/L)		2691	2750	3267
Hardness (CaCO3)		839	1538.9	2623
Carbonate (CO3)		0.0	N/D	N/D
Bicarbonate (HCO3)		458	488	527
Calcium (Ca)		273	204	300
Chloride (Cl)		52.9	53	57
Iron (Fe)		0.33	0.57	2.1
Magnesium (Mg)		38.1	250	455
Manganese (Mn)		N/D	0.06	0.3
Potassium (K)		20.1	1	16
Sodium (Na)		83.8	60	74
Sulfate (SO4)		1700	1500	2200

WATER MONITORING REPORT

Property: Co-op
Station: SBC-4
Location: Huntington Springs
Type: Spring
Frequency: Quarterly

Field Measurements	JAN	2/8/93	MAR	APR	5/20/93	June	July	8/16/93	September	October	November	December
		Date Sampled										
Sampled by:		M.E.C.			CT&E			CT&E		CT&E		
Flow (gpm)	98	97.6	98.4	95.5	111	121	116	131	136	140	140	136
pH		7.7			7.3			7.4		7.01		
Sp. Cond. (ohms)		570			520			560		565		
Temp (C)		18.7			14			11		10		

Lab Measurements												
Analyzed by:		CT&E			CT&E			CT&E		CT&E		
TDS (mg/L)		355			328			328		329		
Hardness (CaCO3)		322			318			300		322		
Aluminum (Al)		N/D			N/D			N/D		N/D		
Arsenic (As)		N/D			0.027			N/D		N/D		
Barium (Ba)		N/D			N/D			0.1		N/A		
Boron (B)		0.09			0.23			N/D		0.10		
Carbonate (CO3)		N/D			N/D			N/D		N/D		
Bicarbonate (HCO3)		328			318			328		334		
Cadmium (Cd)		N/D			N/D			N/D		N/D		
Calcium (Ca)		97.7			78.4			69.0		76		
Chloride (Cl)		125			5.2			4.2		5.0		
Chromium (Cr)		N/D			N/D			N/D		N/A		
Copper (Cu)		N/D			10.03			N/D		N/D		
Fluoride (F)		0.22			0.14			0.21		N/A		
Iron (Fe)		0.08			0.08			0.0		0.2		
Lead (Pb)		N/D			N/D			N/D		N/D		
Magnesium (Mg)		19			29.8			31		32		
Manganese (Mn)		0.01			N/D			N/D		0.03		
Mercury (Hg)		N/D			N/D			N/D		N/A		
Molybdenum (Mo)		N/D			N/D			N/D		0.2		
Nickel (Ni)		N/D			N/D			0.01		N/A		
Nitrogen (NH3)		0.2			N/D			N/D		N/D		
Nitrite (NO2)		0.15			0.01			N/D		0.04		
Nitrate (NO3)		0.28			0.19			0.2		0.3		
Potassium (K)		1.5			N/D			0.9		N/D		
Phosphate (PO4)		0.00			0.01			0.010		0.020		
Selenium (Se)		0.00			0.009			0.002		N/D		
Sodium (Na)		5.84			3.9			4.1		N/D		
Sulfate (SO4)		37			50.0			40.0		31.0		
Sulfide (S)		1.4			N/D			N/D		N/A		
Zinc (Z)		0.01			N/D			0.01		N/D		
Oil & Grease		N/D			1.0			N/D		N/D		
Anions		9.52			6.29			6.21		6.1		
Cations		6.73			6.56			6.19		6.4		
Cation/Anion Balance (%)		-2.86			1.94			-0.11		2.3		

WATER MONITORING REPORT

Property: Co-op
Station: SBC-5
Location: Birch Springs
Type: Spring
Frequency: Quarterly-Baseline

Field Measurements	Date Sampled 2/8/93	March	April	5/20/93	June	July	8/16/93	September	10/21/93	November	December
Sampled by:	CT&E			CT&E			CT&E		CT&E		
Flow (gpm)	27	27	27	26	26	25	24.5	25	24.5	25	24
pH	7.7			7.0			6.8		6.73		
Sp. Cond. (ohms)	740			640			732		762		
Temp (C)	18			15			12.5		10.5		

Lab Measurements				
Analyzed by:	CT&E	CT&E	CT&E	CT&E
TDS (mg/L)	468	444	473	475
Hardness (CaCO3)	306	376	468	485
Aluminum (Al)	N/D	1.0	N/D	N/D
Arsenic (As)	N/D	N/D	N/D	N/D
Barium (Ba)	N/D	N/D	0.1	N/A
Boron (B)	0.11	0.27	N/D	0.1
Carbonate (CO3)	N/D	N/D	N/D	N/D
Bicarbonate (HCO3)	242	322	366	392
Cadmium (Cd)	N/D	N/D	N/D	N/D
Calcium (Ca)	83.1	80.6	100	105
Chloride (Cl)	25	6.5	6.8	10
Chromium (Cr)	N/D	N/D	N/D	N/A
Copper (Cu)	N/D	N/D	N/D	N/D
Fluoride (F)	0.11	0.14	0.21	N/A
Iron (Fe)	0.07	0.12	0.07	0.20
Lead (Pb)	N/D	N/D	N/D	N/D
Magnesium (Mg)	24	42.5	53	54
Manganese (Mn)	0.01	N/D	N/D	0.03
Mercury (Hg)	N/D	N/D	N/D	N/A
Molybdenum (Mo)	N/D	N/D	N/D	0.2
Nickel (Ni)	0.07	N/D	0.01	N/A
Nitrogen (NH3)	0.01	0.08	N/D	N/D
Nitrite (NO2)	N/D	0.01	N/D	N/D
Nitrate (NO3)	151.0	0.06	0.13	N/D
Potassium (K)	0.49	3.5	1.0	N/D
Phosphate (PO4)	N/D	0.008	0.02	0.05
Selenium (Se)	N/D	N/D	0.002	N/D
Sodium (Na)	3.92	6.1	7.2	N/D
Sulfate (SO4)	115	120	120	100
Sulfide (S)	N/D	2.4	N/D	N/A
Zinc (Z)	N/D	N/D	0.01	0.03
Oil & Grease	N/D	1.0	N/D	N/D
Anions	7.0	8.4	8.57	8.7
Cations	6.3	7.87	9.68	9.7
Cation/Anion Balance (%)	-2.86	-6.58	6.11	5.6

WATER MONITORING REPORT

Property: Co-op
Station: SBC-6
Location: Co-Op Development Spring
Type: Spring
Frequency: Quarterly

Field Measurements	Date Sampled 2/15/93	5/28/93	8/16/93	10/21/93
Sampled by:	M.E.C.	M.E.C.	M.E.C.	M.E.C.
Flow (gpm)	Dry	Dry	Dry	Dry
pH	N/A	N/A	N/A	N/A
Sp. Cond. (ohms)	N/A	N/A	N/A	N/A
Temp (C)	N/A	N/A	N/A	N/A

Lab Measurements				
Analyzed by:	N/A	N/A	N/A	N/A
TDS (mg/l)				
Hardness (CaCO3)				
Carbonate (CO3)				
Bicarbonate (HCO3)				
Calcium (Ca)				
Chloride (Cl)				
Iron (Fe)				
Magnesium (Mg)				
Manganese (Mn)				
Potassium (K)				
Sodium (Na)				
Sulfate (SO4)				

WATER MONITORING REPORT

Property: Co-op
Station: SBC-9
Location: Mine Sump #3
Type: Sump
Frequency: Quarterly

Field Measurements	Date Sampled 2/18/93	5/19/93	8/11/93	10/20/93
Sampled by:	M.E.C.	M.E.C.	M.E.C.	M.E.C.
Flow (gpm)	140	177	165	152
pH	6.62	7.35	6.77	7.81
Sp. Cond. (ohms	530	616	725	640
Temp (C)	9.8	10.1	9.9	11.2

Lab Measurements				
Analyzed by:	CT&E	CT&E	CT&E	CT&E
TDS (mg/L)	321	328	384	341
Hardness (CaCO3	294	330	278	326
Carbonate(CO3)	N/D	N/D	N/D	N/D
Bicarbonate (HC	341	348	369	356
Calcium (Ca)	68.2	77.8	61.7	71
Chloride (Cl)	0.5	4.0	6.4	5
Iron (Fe)	0.12	N/D	N/D	N/D
Magnesium (Mg)	30	33	30	36
Manganese (Mn)	0.00	N/D	N/D	N/D
Potassium (K)	0.00	N/D	1	N/D
Sodium (Na)	3.4	3.4	3.6	2
Sulfate (SO4)	20	28	40	31

WATER MONITORING REPORT

Property: Co-op
Station: SBC-10
Location: Mine Sump - 2nd East
Type: Sump
Frequency: Quarterly - Baseline

Field Measurements	Date Sampled 2/18/93	5/19/93	8/11/93	10/20/93
Sampled by:	M.E.C.	M.E.C.	M.E.C.	M.E.C.
Flow (gpm)	185	46	35	28
pH	7.09	7.3	7.18	7.7
Sp. Cond. (ohms	689	635	637	670
Temp (C)	9.8	10	9.9	11.2

Lab Measurements				
Analyzed by:	CT&E	CT&E	CT&E	CT&E
TDS (mg/L)	356	360	335	387
Hardness (CaCO3	319	323	230	248
Carbonate(CO3)	N/D	N/D	N/D	N/D
Bicarbonate (HC	319	320	308	152
Calcium (Ca)	73.2	77.5	52.7	48
Chloride (Cl)	1.3	3.6	11.5	8.0
Iron (Fe)	0.05	0.1	0.09	N/D
Magnesium (Mg)	33.0	31.4	24.0	31.0
Manganese (Mn)	0.00	N/D	N/D	0.1
Potassium (K)	0.00	1.2	2.0	N/D
Sodium (Na)	4.1	3.8	5.1	2
Sulfate (SO4)	40.0	60.0	5.0	70.0

WATER MONITORING REPORT

Property: Co-op
Station: DH-1A
Location: Monitor Well
Type: Well
Frequency: Quarterly - Monthly Depth

Field Measurements	Date Sampled 1/27/93	2/18/93	3/23/93	4/30/93	5/26/93	6/15/93	7/31/93	8/31/93	9/14/93	10/26/93	11/23/93	12/15/93
Sampled by:	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.
Depth From Top (ft)	115.83	112.17	113	113.67	113.67	113.67	114.15	114.12	113.59	114	113.67	113.33
pH	N/A	7.48	N/A	N/A	7.07	N/A	N/A	7.09	N/A	7.21	N/A	N/A
Sp. Cond. (ohms)	N/A	620	N/A	N/A	986	N/A	N/A	681	N/A	763	N/A	N/A
Temp (C)	N/A	10.9	N/A	N/A	10.8	N/A	N/A	11	N/A	11.2	N/A	N/A

Lab Measurements		2/19/93			5/26/93			8/31/93		10/26/93		
Analyzed by:	N/A	CT&E	N/A	N/A	CT&E	N/A	N/A	CT&E	N/A	CT&E	N/A	N/A
TDS (mg/L)		352			597			514		395		
Hardness (CaCO3)		224			391			381.8		338		
Aluminum (Al)		0.99			N/D			2.0		N/D		
Arsenic (As)		0.001			N/D			N/D		N/D		
Barium (Ba)		0.03			N/D			0.2		N/A		
Boron (B)		0.08			0.11			0.08		0.10		
Carbonate (CO3)		N/D			N/D			N/D		N/D		
Bicarbonate (HCO3)		207			352			341		276		
Cadmium (Cd)		N/D			N/D			N/D		N/D		
Calcium (Ca)		41.9			66.6			82.0		66		
Chloride (Cl)		0.1			24.9			7.4		7.0		
Chromium (Cr)		N/D			N/D			N/D		N/A		
Copper (Cu)		N/D			N/D			0.01		N/D		
Fluoride (F)		0.16			0.11			0.2		N/A		
Iron (Total)		2.24			0.4			0.55		0.58		
Iron (Dissolved)		N/A			N/A			N/A		N/D		
Lead (Pb)		N/D			N/D			N/D		N/D		
Magnesium (Mg)		29			54.6			43		42		
Manganese (Total)		0.07			0.05			0.2		0.08		
Manganese (Dissolved)		N/A			N/A			N/A		N/D		
Mercury (Hg)		N/D			0.0017			N/D		N/A		
Molybdenum (Mo)		N/D			N/D			N/D		0.2		
Nickel (Ni)		0.02			N/D			N/D		N/A		
Nitrogen (NH3)		0.05			N/D			0.3		N/D		
Nitrite (NO2)		N/D			N/D			0.02		N/D		
Nitrate (NO3)		0.03			0.09			0.07		N/D		
Potassium (K)		39.3			24.0			1.4		20.0		
Phosphate (PO4)		0.01			0.014			N/D		N/D		
Selenium (Se)		0.02			0.004			N/D		N/D		
Sodium (Na)		13.4			32.5			19		11		
Sulfate (SO4)		120			220.0			130.0		70.0		
Sulfide (S)		1.6			1.4			N/D		N/A		
Zinc (Z)		0.07			0.07			0.16		0.05		
Anions		5.84			10.95			8.39		7.2		
Cations		6.07			9.83			8.48		7.2		
Cation/Anion Balance (%)		2.0			-5.39			0.51		0.5		

WATER MONITORING REPORT

Property: Co-op
Station: DH-2
Location: Monitor Well
Type: Well
Frequency: Quarterly - Monthly Depth

Field Measurements	Date Sampled 1/27/93	2/22/93	3/23/93	4/30/93	5/25/93	6/15/93	7/31/93	8/31/93	9/14/93	10/29/93	11/23/93	12/15/93
Sampled by:	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.
Depth From Top (ft)	22	22.13	22.4	23.83	23.1	24.06	24.35	24.25	26.25	25.7	24.25	23.75
pH	N/A	6.9	N/A	N/A	6.83	N/A	N/A	7.02	N/A	7.34	N/A	N/A
Sp. Cond. (ohms)	N/A	626	N/A	N/A	623	N/A	N/A	625	N/A	749	N/A	N/A
Temp (C)	N/A	11.3	N/A	N/A	11.2	N/A	N/A	11.2	N/A	11.4	N/A	N/A

Lab Measurements												
Analyzed by:	N/A	CT&E	N/A	N/A	CT&E	N/A	N/A	CT&E	N/A	CT&E	N/A	N/A
TDS (mg/L)		356			346			353		290		
Hardness (CaCO3)		316			293			311		237		
Aluminum (Al)		N/D			N/D			N/D		N/D		
Arsenic (As)		0.003			N/D			0.01		N/D		
Barium (Ba)		N/D			0.2			N/D		N/A		
Boron (B)		0.11			0.17			0.08		N/D		
Carbonate (CO3)		N/D			N/D			N/D		N/D		
Bicarbonate (HCO3)		344			340			330		350		
Cadmium (Cd)		0.001			N/D			N/D		N/D		
Calcium (Ca)		70.4			68.3			65.0		75		
Chloride (Cl)		0.8			3.9			4.2		5.0		
Chromium (Cr)		N/D			N/D			N/D		N/A		
Copper (Cu)		N/D			N/D			N/D		N/D		
Fluoride (F)		0.15			0.15			0.21		N/A		
Iron (Fe)		0.51			0.55			2.17		0.7		
Lead (Pb)		N/D			N/D			N/D		N/D		
Magnesium (Mg)		34			29.8			36.0		34		
Manganese (Mn)		0.09			0.1			0.06		0.09		
Mercury (Hg)		0.9			N/D			0.0003		N/A		
Molybdenum (Mo)		N/D			N/D			N/D		0.3		
Nickel (Ni)		0.06			N/D			N/D		N/A		
Nitrogen (NH3)		0.03			0.08			0.21		N/D		
Nitrite (NO2)		N/D			N/D			0.01		N/D		
Nitrate (NO3)		0.03			0.07			0.02		N/D		
Potassium (K)		N/D			2.0			2.0		N/D		
Phosphate (PO4)		N/D			0.005			N/D		0.006		
Selenium (Se)		0.022			N/D			0.009		N/A		
Sodium (Na)		8.1			5.4			22.9		N/D		
Sulfate (SO4)		30			30.0			26.0		28.0		
Sulfide (S)		3.4			1.0			N/D		N/A		
Zinc (Z)		0.07			N/D			N/D		N/D		
Anions		6.15			6.18			5.9		4.8		
Cations		6.66			6.14			7.2		4.8		
Cation/Anion Balance (%)		3.91			-0.28			9.8		-1.8		

WATER MONITORING REPORT

Property: Co-op
Station: DH-3
Location: Monitor Well
Type: Well
Frequency: Quarterly - Monthly Depth

Field Measurements	Date Sampled 1/27/93	2/19/93	3/23/93	4/30/93	5/28/93	6/15/93	7/31/93	8/31/93	9/14/93	10/21/93	11/23/93
Sampled by:	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	
Depth From Top (ft)	125.92	125.42	125.4	125.83	125.8	125.75	126.2	125.8	125.42	125.1	Abandoned
pH	N/A	7.29	N/A	N/A	7.04	N/A	N/A	7.08	N/A	7.25	
Sp. Cond. (ohms)	N/A	608	N/A	N/A	591	N/A	N/A	611	N/A	607	
Temp (C)	N/A	10.6	N/A	N/A	11.2	N/A	N/A	10.6	N/A	12	

Lab Measurements		2/19/93								
Analyzed by:	N/A	CT&E	N/A	N/A	CT&E	N/A	N/A	CT&E	N/A	CT&E
TDS (mg/L)		342			349			317		317
Hardness (CaCO3)		301			283			236.9		366
Aluminum (Al)		N/D			N/D			N/D		N/D
Arsenic (As)		N/D			0.013			N/D		0.02
Barium (Ba)		N/D			N/D			0.10		N/A
Boron (B)		0.08			0.11			N/D		0.10
Carbonate (CO3)		N/D			N/D			N/D		N/D
Bicarbonate (HCO3)		256			340			329		355
Cadmium (Cd)		0.00			N/D			N/D		N/D
Calcium (Ca)		67.8			64.6			52.0		84
Chloride (Cl)		4.4			4.5			5.3		5.0
Chromium (Cr)		N/D			N/D			N/D		N/A
Copper (Cu)		N/D			N/D			0.01		N/D
Fluoride (F)		0.16			0.12			0.17		N/A
Iron (Fe)		1.59			1.64			0.23		1.62
Lead (Pb)		N/D			N/D			N/D		N/D
Magnesium (Mg)		32			29.6			26		38
Manganese (Mn)		0.37			0.03			N/D		0.07
Mercury (Hg)		0.06			N/D			N/D		N/A
Molybdenum (Mo)		N/D			N/D			N/D		N/D
Nickel (Ni)		0.02			N/D			0.02		N/A
Nitrogen (NH3)		0.05			0.08			N/D		N/D
Nitrite (NO2)		N/D			N/D			N/D		0.01
Nitrate (NO3)		0.03			0.01			0.03		N/D
Potassium (K)		N/D			0.5			1.9		N/D
Phosphate (PO4)		0.01			0.01			N/D		0.001
Selenium (Se)		0.019			0.004			N/D		N/D
Sodium (Na)		4.3			3.3			3.3		N/D
Sulfate (SO4)		44			29.0			24		24.0
Sulfide (S)		1.6			23.0			N/D		N/A
Zinc (Z)		0.07			0.06			N/D		N/D
Anions		5.04			6.18			5.92		6.3
Cations		6.2			5.81			4.92		7.3

WATER MONITORING REPORT

Property: Co-op Mining Company
Station: NPDES
Location: Mine Discharge
Type: Permit UTG040006 (004)
Frequency: Monthly

Field Measurements	Date Sampled 1/18/93	2/15/93	3/10/93	4/8/93	5/18/93	6/11/93	7/09/93	8/11/93	9/24/93	10/05/93	11/29/93	12/15/93
Sampled by:	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.
Flow (gpm)	168	225	68	39.5	150	166.5	166.5	180	166	144	123	123
pH	7.32	7.33	7.28	7.22	7.39	7.38	7.43	7.54	7.5	7.6	7.28	7.41
Sp. Cond. (ohms)	651	691	665	683	707	604	668	709	607	643	651	634
Temp (C)	15.6	18	11.9	11	10.2	10.4	10.8	10.5	10.2	9.6	9.8	8.6

Lab Measurements												
Analyzed by:	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E
Dissolved Solids	353	420	376	361	299	615	319	399	329	318	332	328
Suspended Solids	0.0	15	2.0	3.0	2.0	14.0	N/D	5.0	2.0	3.0	3.0	N/D
Settleable Solids	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Oil & Grease	0.0	0.0	0.0	N/D	1.8	N/D	N/D	0.6	N/D	1.0	N/D	N/D
Iron (Fe)	0.0	0.11	0.0	N/D	N/D	0.8	0.1	N/D	0.05	0.09	N/R	N/D

Field Measurements	1/26/93	2/26/93	3/24/93	4/21/93	5/06/93	6/24/93	7/28/93	8/25/93	9/14/93	10/21/93	11/12/93	12/27/93
Sampled by:	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.	M.E.C.
pH	7.29	7.2	7.44	7.25	7.3	7.4	7.48	7.39	7.23	7.34	7.36	7.34
Sp. Cond. (ohms)	667	683	632	656	648	642	650	652	606	589	645	620
Temp (C)	8.5	14.4	14.8	10.6	10.4	10.4	10.7	11	11.1	12.6	10.1	9.2

TRAIL CANYON MINE
1993
WATER MONITORING DATA

WATER MONITORING REPORT

Property:	Co-op
Station:	UT-1
Location:	Upper Trail Creek
Type:	Stream
Frequency:	Biannually

Field Measurements	Date Sampled 05/06/93	5/26/93	10/24/93
Sampled By:	M.E.C.	M.E.C.	M.E.C.
Flow (gpm)	Dry	122	<0.05
pH	N/A	8.17	N/A
Sp. Cond. (ohms)	N/A	492	N/A
Temp (C)	N/A	6.7	N/A
Diss. O. (ppm)	N/A	6.1	N/A

Lab Measurements			
Analyzed by:	N/A	CT&E	N/A
Settleable Solids		N/D	
Suspended Solids		63	
Dissolved Solids		262	
Hardness (CaCO3)		239	
Acidity (CaCO3)		N/D	
Aluminum (Al)		2.0	
Arsenic (As)		N/D	
Barium (Ba)		0.3	
Boron (B)		N/D	
Carbonate (CO3)		N/D	
Bicarbonate (HCO3)		258	
Cadmium (Cd)		N/D	
Calcium (Ca)		61.4	
Chloride (Cl)		3.8	
Chromium (Cr)		0.0014	
Copper (Cu)		0.03	
Fluoride (F)		0.16	
Iron (Fe)		1.27	
Lead (Pb)		N/D	
Magnesium (Mg)		20.9	
Manganese (Mn)		0.03	
Mercury (Hg)		N/D	
Molybdenum (Mo)		N/D	
Nickel (Ni)		N/D	
Nitrogen (NH3)		0.08	
Nitrite (NO2)		N/D	
Nitrate (NO3)		0.29	
Potassium (K)		N/D	
Phosphate (PO4)		0.055	
Selenium (Se)		0.004	
Sodium (Na)		3.0	
Sulfate (SO4)		20	
Sulfide (S)		3.8	
Zinc (Zn)		N/D	
Oil & Grease		0.3	
Anions		4.66	
Cations		4.94	
Cation/Anion Balance (%)		2.7	

WATER MONITORING REPORT

Property:	Co-op
Station:	LT-1
Location:	Lower Trail Creek
Type:	Stream
Frequency:	Biannually

Field Measurements	Date Sampled 05/06/93	5/26/93	10/24/93
Sampled By:	M.E.C.	M.E.C.	M.E.C.
Flow (gpm)	30	153	38
pH	7.82	8.08	8.04
Sp. Cond. (ohms)	1027	1000	975
Temp (C)	9.9	9.4	8.7
Diss. O. (ppm)	6	6.2	5.8

Lab Measurements			
Analyzed by:	CT&E	CT&E	CT&E
Settleable Solids	N/D	N/D	N/D
Suspended Solids	5	99	3
Dissolved Solids	552	605	535
Hardness (CaCO3)	464	535	487
Aluminum (Al)	N/D	2.0	N/D
Arsenic (As)	N/D	N/D	N/D
Barium (Ba)	N/D	N/D	N/A
Boron (B)	0.26	0.2	0.2
Carbonate (CO3)	N/D	N/D	N/D
Bicarbonate (HCO3)	420	407	463
Cadmium (Cd)	0.000	N/D	N/D
Calcium (Ca)	75.3	94.5	88
Chloride (Cl)	31.5	28.1	25
Chromium (Cr)	N/D	0.0036	N/A
Copper (Cu)	0.03	N/D	N/D
Fluoride (F)	0.28	0.29	N/A
Iron (Fe)	0.21	1.99	0.25
Lead (Pb)	N/D	0.003	N/D
Magnesium (Mg)	66.9	72.6	65
Manganese (Mn)	N/D	0.06	0.04
Mercury (Hg)	N/D	N/D	N/A
Molybdenum (Mo)	N/D	N/D	N/D
Nickel (Ni)	N/D	N/D	N/A
Nitrogen (NH3)	N/D	N/D	N/D
Nitrite (NO2)	N/D	0.02	N/D
Nitrate (NO3)	0.04	1.57	0.5
Potassium (K)	4.9	9.0	N/D
Phosphate (PO4)	N/D	0.16	0.007
Selenium (Se)	0.005	N/D	N/D
Sodium (Na)	21.4	20.8	21
Sulfate (SO4)	140	170	90
Sulfide (S)	2.8	20.4	N/A
Zinc (Zn)	N/D	N/D	N/D
Oil & Grease	1.1	0.2	N/D
Cations	10.30	11.81	10.6
Anions	10.55	10.87	10
Cation/Anion Balance	-1.16	1.28	3.1

WATER MONITORING REPORT

Property:	Co-op
Station:	PS-1
Location:	Portal Spring (AML)
Type:	Spring
Frequency:	Biannually

Field Measurements	Date Sampled 05/06/93	10/24/93
Sampled by:	M.E.C.	M.E.C.
Flow (gpm)	4	Dry
pH	7.14	N/A
Sp. Cond. (ohms)	940	N/A
Temp (C)	9.3	N/A

Lab Measurements		
Analyzed by:	CT&E	N/A
TDS (mg/L)	529	
Hardness (CaCO3)	444	
Aluminum (Al)	N/D	
Arsenic (As)	N/D	
Barium (Ba)	N/D	
Boron (B)	0.17	
Carbonate(CO3)	N/D	
Bicarbonate (HCO3)	409	
Cadmium (Cd)	0.0002	
Calcium (Ca)	81.8	
Chloride (Cl)	19.5	
Chromium (Cr)	N/D	
Copper (Cu)	N/D	
Fluoride (F)	0.18	
Iron (Fe)	0.34	
Lead (Pb)	N/D	
Magnesium (Mg)	58.2	
Manganese (Mn)	N/D	
Mercury (Hg)	N/D	
Molybdenum (Mo)	N/D	
Nickel (Ni)	N/D	
Nitrogen (NH3)	N/D	
Nitrite (NO2)	0.02	
Nitrate (NO3)	0.52	
Potassium (K)	2.4	
Phosphate (PO4)	N/D	
Selenium (Se)	N/D	
Sodium (Na)	25.6	
Sulfate (SO4)	100	
Sulfide (S)	4	
Zinc (Zn)	N/D	
Oil & Grease	1.9	
Cations	10.03	
Anions	9.2	
Cation/Anion Balance	4.35	

WATER MONITORING REPORT

Property:	Co-op
Station:	TS-1
Location:	Trail Spring (AML)
Type:	Spring
Frequency:	Biannually

Field Measurements	Date Sampled 05/06/93	10/24/93
Sampled by:	M.E.C.	M.E.C.
Flow (gpm)	20	11
pH	7.22	7.48
Sp. Cond. (ohms)	980	863
Temp (C)	9.4	9.7

Lab Measurements		
Analyzed by:	CT&E	CT&E
TDS (mg/L)	534	378
Hardness (CaCO3)	426	435
Aluminum (Al)	N/D	N/D
Arsenic (As)	N/D	N/D
Barium (Ba)	N/D	N/A
Boron (B)	0.23	0.1
Carbonate(CO3)	N/D	N/D
Bicarbonate (HCO3)	430	422
Cadmium (Cd)	0.0002	N/D
Calcium (Ca)	75.1	85
Chloride (Cl)	21.7	16
Chromium (Cr)	N/D	N/A
Copper (Cu)	0.03	N/D
Fluoride (F)	0.18	N/A
Iron (Fe)	0.15	0.21
Lead (Pb)	N/D	N/D
Magnesium (Mg)	58	54
Manganese (Mn)	N/D	0.04
Mercury (Hg)	N/D	N/A
Molybdenum (Mo)	N/D	0.2
Nickel (Ni)	0.1	N/A
Nitrogen (NH3)	N/D	N/D
Nitrite (NO2)	N/D	N/D
Nitrate (NO3)	0.43	0.6
Potassium (K)	2.0	N/D
Phosphate (PO4)	N/D	0.01
Selenium (Se)	N/D	N/D
Sodium (Na)	13.1	12
Sulfate (SO4)	100	80
Sulfide (S)	1.6	N/A
Zinc (Zn)	N/D	N/D
Cations	9.13	9.2
Anions	9.59	9
Cation/Anion Balance	-2.46	0.9

WATER MONITORING REPORT

Property:	Co-op
Station:	CS-1
Location:	Co-Op Spring
Type:	Spring
Frequency:	Biannually

Field Measurements	Date Sampled 05/06/93	10/24/93
Sampled by:	M.E.C.	M.E.C.
Flow (gpm)	5	15
pH	7.25	7.36
Sp. Cond. (ohms)	824	766
Temp (C)	11.2	10.6

Lab Measurements		
Analyzed by:	CT&E	CT&E
TDS (mg/L)	413	440
Hardness (CaCO3)	366	423
Aluminum (Al)	N/D	N/D
Arsenic (As)	N/D	N/D
Barium (Ba)	N/D	N/A
Boron (B)	0.15	0.1
Carbonate(CO3)	N/D	N/D
Bicarbonate (HCO3)	387	413
Cadmium (Cd)	0.0002	N/D
Calcium (Ca)	82.8	97
Chloride (Cl)	8.7	15
Chromium (Cr)	N/D	N/A
Copper (Cu)	N/D	N/D
Fluoride (F)	0.12	N/A
Iron (Fe)	0.13	0.21
Lead (Pb)	0.003	N/D
Magnesium (Mg)	38.7	44
Manganese (Mn)	N/D	0.03
Mercury (Hg)	N/D	N/A
Molybdenum (Mo)	N/D	0.4
Nickel (Ni)	N/D	N/A
Nitrogen (NH3)	N/D	N/D
Nitrite (NO2)	N/D	N/D
Nitrate (NO3)	0.07	N/D
Potassium (K)	2.8	N/D
Phosphate (PO4)	N/D	0.002
Selenium (Se)	0.01	N/D
Sodium (Na)	4.6	N/D
Sulfate (SO4)	100	60
Sulfide (S)	0.4	N/A
Zinc (Zn)	N/D	1.5
Cations	10.03	8.5
Anions	9.2	8.3
Cation/Anion Balance	-6.16	1

WATER MONITORING REPORT

Property:	Co-op
Station:	BP-1
Location:	T.C. Ball Park Springs
Type:	Spring
Frequency:	Biannually

Field Measurements	Date Sampled 05/06/93	10/26/93
Sampled by:	M.E.C.	M.E.C.
Flow (gpm)	0.2	<0.1
pH	7.13	8.06
Sp. Cond. (ohms)	966	1009
Temp (C)	9.2	10.7

Lab Measurements		
Analyzed by:	CT&E	CT&E
TDS (mg/L)	615	475
Hardness (CaCO3)	507	453
Aluminum (Al)	N/D	N/D
Arsenic (As)	N/D	N/D
Barium (Ba)	N/D	N/A
Boron (B)	0.46	0.4
Carbonate(CO3)	N/D	N/D
Bicarbonate (HCO3)	403	474
Cadmium (Cd)	0.0002	N/D
Calcium (Ca)	77.4	89
Chloride (Cl)	22.8	16
Chromium (Cr)	N/D	N/A
Copper (Cu)	N/D	N/D
Fluoride (F)	0.29	N/A
Iron (Fe)	0.18	0.76
Lead (Pb)	N/D	N/D
Magnesium (Mg)	76.1	56
Manganese (Mn)	N/D	0.28
Mercury (Hg)	N/D	N/A
Molybdenum (Mo)	N/D	0.3
Nickel (Ni)	N/D	N/A
Nitrogen (NH3)	0.08	N/D
Nitrite (NO2)	0.02	N/D
Nitrate (NO3)	0.18	N/D
Potassium (K)	2.6	N/D
Phosphate (PO4)	N/D	N/D
Selenium (Se)	4.0	N/D
Sodium (Na)	15.3	12
Sulfate (SO4)	210	80
Sulfide (S)	2.8	N/A
Zinc (Zn)	N/D	N/D
Cations	10.84	9.6
Anions	11.11	9.9
Cation/Anion Balance	-2.95	-1.7

WATER MONITORING REPORT

Property: Co-op
Station: SP-1
Location: Trail Sed. Pond Inlet
Type: Stream
Frequency: Biannually

Field Measurements	Date Sampled 05/06/93	10/26/93
Sampled By:	M.E.C.	M.E.C.
Flow (gpm)	Dry	Dry
pH	N/A	N/A
Sp. Cond. (ohms)	N/A	N/A
Temp (C)	N/A	N/A
Diss. O. (ppm)	N/A	N/A

Lab Measurements		
Analyzed by:	N/A	N/A
TDS (mg/L)		
Hardness (CaCO3)		
Aluminum (Al)		
Arsenic (As)		
Barium (Ba)		
Boron (B)		
Carbonate(CO3)		
Bicarbonate (HCO3)		
Cadmium (Cd)		
Calcium (Ca)		
Chloride (Cl)		
Chromium (Cr)		
Copper (Cu)		
Fluoride (F)		
Iron (Fe)		
Lead (Pb)		
Magnesium (Mg)		
Manganese (Mn)		
Mercury (Hg)		
Molybdenum (Mo)		
Nickel (Ni)		
Nitrogen (NH3)		
Nitrite (NO2)		
Nitrate (NO3)		
Potassium (K)		
Phosphate (PO4)		
Selenium (Se)		
Sodium (Na)		
Sulfate (SO4)		
Sulfide (S)		
Zinc (Zn)		
Oil & Grease		
Cations		
Anions		
Cation/Anion Balance		

WATER MONITORING REPORT

Property: Co-op
Station: CO-1
Location: TCC-6 culvert Outlet
Type: Suspended Solids
Frequency: During Storm Events

Field Measurements	Date Sampled 05/06/93
Sampled By:	M.E.C.
Flow (gpm)	Dry
pH	N/A
Sp. Cond. (ohms)	N/A
Temp (C)	N/A
Diss. O. (ppm)	N/A

Lab Measurements	
Analyzed by:	N/A
Settleable Solids	
Suspended Solids	
Dissolved Solids	
Hardness (CaCO3)	
Acidity (CaCO3)	
Aluminum (Al)	
Arsenic (As)	
Barium (Ba)	
Boron (B)	
Carbonate (CO3)	
Bicarbonate (HCO3)	
Cadmium (Cd)	
Calcium (Ca)	
Chloride (Cl)	
Chromium (Cr)	
Copper (Cu)	
Fluoride (F)	
Iron (Fe)	
Lead (Pb)	
Magnesium (Mg)	
Manganese (Mn)	
Mercury (Hg)	
Molybdenum (Mo)	
Nickel (Ni)	
Nitrogen (NH3)	
Nitrite (NO2)	
Nitrate (NO3)	
Potassium (K)	
Phosphate (PO4)	
Selenium (Se)	
Sodium (Na)	
Sulfate (SO4)	
Sulfide (S)	
Zinc (Zn)	
Oil & Grease	
Anions	
Cations	
Cation/Anion Balance (%)	

No discharges were observed at monitoring point Sealed Mine Entries and Access during 1993.

APPENDIX B
CLIMATOLOGICAL DATA

Precipitation - Bear Canyon

Date	Gauge Reading	Precipitation	Date	Gauge Reading	Precipitation
01/01/93	0.00		03/11/93	0.00	
01/02/93	0.00		.	.	no precipitation
01/03/93	0.00		.	.	during this
01/04/93	0.00		.	.	period
01/05/93	0.43	snow melt	03/16/93	0.00	
01/06/93	0.00	snow	03/17/93	0.17	rain
01/07/93	0.02	light snow	03/18/93	0.00	
01/08/93	0.08	snow	.	.	no precipitation
01/09/93	0.00		.	.	during this
.	.	no precipitation	.	.	period
.	.	during this	03/23/93	0.00	
.	.	period	03/24/93	0.05	rain
01/16/93	0.00		03/25/93	0.00	
01/17/93	0.01	lt snow	03/26/93	0.00	
01/18/93	0.00		03/27/93	0.42	snow/showers
.	.	no precipitation	03/28/93	1.22	heavyrain/snow
.	.	during this	03/29/93	0.00	
.	.	period	03/30/93	0.04	morning snow
02/01/93	0.00	snowing	03/31/93	0.00	
02/02/93	0.05		04/01/93	0.10	
02/03/93	0.03		04/02/93	0.01	
02/04/93	0.00		04/03/93	0.00	
.	.	no precipitation	04/04/93	0.08	
.	.	during this	04/05/93	0.10	
.	.	period	04/06/93	0.00	
02/09/93	0.00	snow	.	.	no precipitation
02/10/93	0.02	snow melt	.	.	during this
02/11/93	0.07	snow melt	.	.	period
02/12/93	0.00		04/11/93	0.00	
02/13/93	0.00	snow	04/12/93	0.02	snow
02/14/93	0.01	snow melt	04/13/93	0.00	
02/15/93	0.01	snow melt	04/14/93	0.00	
02/16/93	0.00	snow	04/15/93	0.00	
02/17/93	0.00	snow	04/16/93	0.00	
02/18/93	0.07	snow melt	04/17/93	0.00	
02/19/93	0.05	snow melt	04/18/93	0.02	snow showers
02/20/93	0.01	snow	04/19/93	0.00	
02/21/93	0.02	snow melt	.	.	no precipitation
02/22/93	0.00		.	.	during this
02/23/93	0.01	snow	.	.	period
02/24/93	0.06	snow melt	04/25/93	0.00	
02/25/93	0.00	snow melt	04/26/93	0.01	showers
02/26/93	0.00		04/27/93	0.00	
02/27/93	0.00	snow	.	.	no precipitation
02/28/93	0.02	snow melt	.	.	during this
03/01/93	0.00		.	.	period
.	.	no precipitation	05/04/93	0.00	
.	.	during this	05/05/93	0.01	lt snow showers
.	.	period	05/06/93	0.05	snow showers
03/09/93	0.00		05/07/93	0.06	morning rain
03/10/93	0.24	rain	05/08/93	0.08	snow

Precipitation - Bear Canyon

Date	Gauge Reading	Precipitation
05/09/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
05/14/93	0.00	
05/15/93	0.15	showers
05/16/93	0.00	
05/17/93	0.00	
05/18/93	0.00	
05/19/93	0.00	
05/20/93	0.01	lt rain
05/21/93	0.00	
05/22/93	0.04	pm showers
05/23/93	0.00	
05/24/93	0.00	
05/25/93	0.00	
05/26/93	0.00	
05/27/93	0.30	thundershowers
05/28/93	0.00	
05/29/93	0.00	
05/30/93	0.00	
05/31/93	0.00	
06/01/93	0.00	
06/02/93	0.05	showers
06/03/93	0.00	lt rain
06/04/93	0.00	
06/05/93	0.00	
06/06/93	0.04	rain
06/07/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
06/16/93	0.00	
06/17/93	0.15	showers
06/18/93	0.12	showers
06/19/93	0.00	
06/20/93	0.00	
06/21/93	0.01	showers
06/22/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
07/07/93	0.00	
07/08/93	0.03	showers
07/09/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
07/22/93	0.00	
07/23/93	0.07	
07/24/93	0.00	

Date	Gauge Reading	Precipitation
07/25/93	0.00	
07/26/93	0.00	
07/27/93	0.00	
07/28/93	0.00	
07/29/93	0.00	
07/30/93	0.01	showers
07/31/93	0.00	
08/01/93	0.00	
08/02/93	0.00	
08/03/93	0.00	
08/04/93	0.01	showers
08/05/93	0.00	
08/06/93	0.00	
08/07/93	0.09	showers
08/08/93	0.04	showers
08/09/93	0.32	showers
08/10/93	0.58	rain/sleet
08/11/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
08/18/93	0.00	
08/19/93	0.08	rain
08/20/93	0.35	heavy rain
08/21/93	0.00	
08/22/93	0.00	
08/23/93	0.00	
08/24/93	0.00	
08/25/93	0.07	showers
08/26/93	0.00	
08/27/93	0.00	
08/28/93	0.00	
08/29/93	0.00	
08/30/93	0.06	rain
08/31/93	0.05	rain
09/01/93	0.00	
09/02/93	0.00	
09/03/93	0.00	
09/04/93	0.04	showers
09/05/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
09/15/93	0.00	
09/16/93	0.04	showers
09/17/93	0.04	showers
09/18/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
10/04/93	0.00	

Precipitation - Bear Canyon

Date	Gauge Reading	Precipitation	Date	Gauge Reading	Precipitation
10/05/93	0.13	showers	11/12/93	0.25	snow
10/06/93	0.12	showers	11/13/93	0.00	
10/07/93	0.03	lt. rain	.	.	no precipitation
10/08/93	0.23	rain/snow	.	.	during this
10/09/93	0.00		.	.	period
10/10/93	0.00		11/21/93	0.00	snow
10/11/93	0.00		11/22/93	0.21	snow
10/12/93	0.40	rain	11/23/93	0.00	
10/13/93	0.00		.	.	no precipitation
10/14/93	0.00		.	.	during this
10/15/93	0.11	showers	.	.	period
10/16/93	0.00		12/11/93	0.00	
10/17/93	0.31	rain showers	12/12/93	0.18	snow
10/18/93	0.00		12/13/93	0.00	
.	.	no precipitation	.	.	no precipitation
.	.	during this	.	.	during this
.	.	period	.	.	period
11/10/93	0.00		12/31/93	0.00	
11/11/93	0.16	snow			

8.53

Precipitation - Trail Canyon

Date	Gauge Reading	Precipitation
01/01/93	0.00	
01/02/93	0.00	
01/03/93	0.00	
01/04/93	0.00	
01/05/93	0.43	snow melt
01/06/93	0.00	snow
01/07/93	0.04	lt. snow
01/08/93	0.10	snow
01/09/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
01/16/93	0.00	
01/17/93	0.01	light snow
01/18/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
02/01/93	0.00	snow
02/02/93	0.03	
02/03/93	0.07	
02/04/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
02/09/93	0.00	snow
02/10/93	0.02	snow melt
02/11/93	0.08	snow melt
02/12/93	0.01	
02/13/93	0.00	snow
02/14/93	0.01	snow melt
02/15/93	0.01	snow melt
02/16/93	0.00	snow
02/17/93	0.02	snow
02/18/93	0.05	snow melt
02/19/93	0.03	snow melt
02/20/93	0.00	snow
02/21/93	0.01	snow melt
02/22/93	0.00	
02/23/93	0.00	snow
02/24/93	0.00	snow
02/25/93	0.00	snow melt
02/26/93	0.01	snow melt
02/27/93	0.00	lt. snow
.	.	no precipitation
.	.	during this
.	.	period
03/09/93	0.00	
03/10/93	0.17	rain
03/11/93	0.00	
03/12/93	0.00	

Date	Gauge Reading	Precipitation
03/13/93	0.00	
03/14/93	0.00	
03/15/93	0.00	
03/16/93	0.00	
03/17/93	0.29	showers
03/18/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
03/23/93	0.00	
03/24/93	0.05	
03/25/93	0.00	
03/26/93	0.00	
03/27/93	0.45	snow showers
03/28/93	1.24	snow, rain
03/29/93	0.00	
03/30/93	0.08	snow
03/31/93	0.00	
04/01/93	0.18	
04/02/93	0.03	
04/03/93	0.00	
04/04/93	0.15	
04/05/93	0.16	
04/06/93	0.00	
04/07/93	0.00	
04/08/93	0.00	
04/09/93	0.03	
04/10/93	0.00	
04/11/93	0.00	
04/12/93	0.09	
04/13/93	0.00	
04/14/93	0.00	
04/15/93	0.00	
04/16/93	0.00	
04/17/93	0.00	
04/18/93	0.04	
04/19/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
04/25/93	0.00	
04/26/93	0.06	
04/27/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
05/04/93	0.00	
05/05/93	0.01	lt. snow showers
05/06/93	0.09	showers
05/07/93	0.11	rain
05/08/93	0.10	heavy snow

Precipitation - Trail Canyon

Date	Gauge Reading	Precipitation
05/09/93	0.00	
05/10/93	0.00	
05/11/93	0.00	
05/12/93	0.00	
05/13/93	0.04	showers
05/14/93	0.00	
05/15/93	0.13	showers
05/16/93	0.00	
05/17/93	0.00	
05/18/93	0.00	
05/19/93	0.00	
05/20/93	0.18	showers
05/21/93	0.00	
05/22/93	0.04	showers
05/23/93	0.00	
05/24/93	0.00	
05/25/93	0.00	
05/26/93	0.00	
05/27/93	0.40	showers
05/28/93	0.03	showers
05/29/93	0.00	
05/30/93	0.00	
05/31/93	0.00	
06/01/93	0.00	
06/02/93	0.20	showers
06/03/93	0.00	
06/04/93	0.00	
06/05/93	0.00	
06/06/93	0.13	rain
06/07/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
06/16/93	0.00	
06/17/93	0.17	showers
06/18/93	0.29	showers
06/19/93	0.00	
06/20/93	0.00	
06/21/93	0.05	showers
06/22/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
07/04/93	0.00	
07/05/93	0.01	lt. showers
07/06/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
07/22/93	0.00	
07/23/93	0.12	showers
07/24/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
07/29/93	0.00	
07/30/93	0.02	showers
07/31/93	0.00	
08/01/93	0.00	
08/02/93	0.00	
08/03/93	0.00	
08/04/93	0.03	showers
08/05/93	0.00	
08/06/93	0.00	
08/07/93	0.12	showers
08/08/93	0.06	showers
08/09/93	0.62	showers
08/10/93	0.22	rain
08/11/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
08/18/93	0.00	
08/19/93	0.18	rain
08/20/93	0.59	heavy rain
08/21/93	0.00	
08/22/93	0.00	
08/23/93	0.00	
08/24/93	0.00	
08/25/93	0.19	rain
08/26/93	0.00	
08/27/93	0.00	
08/28/93	0.00	
08/29/93	0.00	
08/30/93	0.15	showers
08/31/93	0.16	rain
09/01/93	0.00	
09/02/93	0.00	
09/03/93	0.00	
09/04/93	0.01	rain
09/05/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
09/15/93	0.00	
09/16/93	0.19	showers
09/17/93	0.06	showers
09/18/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
10/04/93	0.00	

Precipitation - Trail Canyon

Date	Gauge Reading	Precipitation
10/05/93	0.18	showers
10/06/93	0.24	showers
10/07/93	0.07	lt. rain
10/08/93	0.22	rain/snow
10/09/93	0.05	lt. rain
10/10/93	0.00	
10/11/93	0.00	
10/12/93	0.55	rain
10/13/93	0.00	
10/14/93	0.02	rain
10/15/93	0.00	
10/16/93	0.18	rain/snow
10/17/93	0.34	rain
10/18/93	0.00	
10/19/93	0.00	
10/20/93	0.00	
10/21/93	0.00	
10/22/93	0.00	

Date	Gauge Reading	Precipitation
10/23/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
11/10/93	0.00	
11/11/93	0.15	snow
11/12/93	0.35	snow
11/13/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
12/11/93	0.00	
12/12/93	0.22	snow
12/13/93	0.00	
.	.	no precipitation
.	.	during this
.	.	period
12/31/93	0.00	

11.22

APPENDIX C
SUBSIDENCE MONITORING

CO-OP MINING COMPANY
SUBSIDENCE MONITORING
TRAIL AND BEAR CANYON MINES

STATION	LOCATION	ELEVATION 7/19/87	09/25/92	10/03/93	CHANGE Last	Acc.
SMS-1	Trail/Bear	9188.57	9188.40	9188.40	0.00	-0.17
SMS-2	Bear Cyn.	8542.60	8542.13	8542.03	-0.10	-0.57
SMS-3	Trail Cyn.	8769.06	8768.93	8768.78	-0.15	-0.28
SMS-4	Trail Cyn.	8410.00	8409.89	8409.69	-0.20	-0.31
CON-5	Bear Cyn.	9379.91	9379.91	9379.91	-	-
CON-6	Bear Cyn.	9491.62	9491.62	9491.62	-	-
SMS-7	Bear Cyn.	9398.78	9398.78	9398.78	0.00	0.00
SMS-8	McCadden	9062.15	9062.16	9062.17	+0.01	+0.02
SMS-9	Bear Cyn.	9348.91	9348.90	9348.85	-0.05	-0.06
SMS-10	Bear Cyn.	9331.62	9331.64	9331.70	+0.06	+0.08

Notes: (1) CON-6 and SMS-7 through SMS-10 established 9/22/91.
(2) The area was walked between all stations. No visible movement,cracks or other subsidence effects were noted during the survey, other than those shown on Plate 3-3.

REGISTERED PROFESSIONAL ENGINEER
No 4548
DAN W. GUY
10/3/93
STATE OF UTAH

APPENDIX D
VEGETATION MONITORING

VEGETATION SAMPLING OF THE TRAIL CANYON AREA

1993

FOR THE CO-OP MINING COMPANY

Prepared by

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Report Date: March 1994
Fieldwork Date: July - September 1993

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VEGETATION MONITORING OF THE TRAIL CANYON AREAS

1993

SCOPE

The purpose of this document is to report vegetation data of several areas that have been previously revegetated by the CO-OP Mining Company. Additionally, the areas will be compared to a Reference Area selected earlier by representatives of the company for a standard of revegetation success. All areas sampled for this report were located in Trail Canyon, Emery County, Utah. The areas sampled and reported within the following document were:

BTCA 1
BTCA 2
BTCA 4
BTCA 5
BTCA 6
Trail Canyon Reference Area
BTCA 3
BTCA 7
BTCA 8
BTCA 9
Pond Drainage Areas
Residential Exclusion Area.

INTRODUCTION

General Site Description

Trail Canyon, a branch of Huntington Canyon, is located west of the town of Huntington, Utah. Several previously disturbed areas have been reclaimed and reseeded in an effort to provide permanent, self-perpetuating vegetative cover. Elevations of the reseeded areas in the canyon range from 6,925 ft to nearly 7,275 ft above sea level. Slopes that surround the canyon are primarily dominated by pinyon-juniper, Salina wildrye and mountain brush communities. Prior to disturbance and development, the canyon bottoms were probably comprised chiefly of sagebrush/grass and riparian communities. The vegetation of the reclaimed areas in the canyon were all the result of disturbances caused by previous mining activities.

The Reference Area previously selected by the CO-OP Mining Company is also located in Trail Canyon at approximately the same elevation as the reclaimed areas. The plant community of the Reference Area is basically pinyon-juniper/Salina wildrye. It has an eastern exposure with a slope of approximately 30 degrees.

METHODS

Methodologies used herein were performed in accordance with the guidelines supplied by the State of Utah, Division of Oil, Gas and Mining (DOGM).

Quantitative and qualitative data were taken on the vegetation of the reclaimed and reference areas. Sampling was conducted between July 22 and September 9, 1993.

Transect and Quadrat Placement

Quadrats were placed in the sample areas by a regular/random technique. First, points were marked at regular intervals on a tape-line along the reclaimed road (BTCA Nos. 1, 2, 4, & 5). From these points a sample location was chosen using a random number. Cover was then obtained from this sample location. Belt transects were also placed in each of these areas to record woody species density.

In BTCA Nos. 3, 6, 7, 8, 9, the Residential Exclusion Area and the Reference Area, transects were placed in locations randomly. Once the transect lines were placed, regular points were then marked on them. From these marks, a random number dictated the direction and distance to place the quadrats at

right angles from the transect lines. Cover and density were obtained from these sample locations.

Cover and Composition

Cover estimates were made using ocular methods with meter square quadrats. Species composition and relative frequencies were also assessed from the quadrats. Additional information recorded on the raw data sheets were: estimated precipitation, slope, exposure, grazing use, animal disturbance and other appropriate notes. To be consistent, plant nomenclature basically follows those names uses in the species mixes (for some plants, scientific names have recently been changed in the taxonomic literature).

Woody Species Density

Density of woody plant species of the reclaimed areas were recorded using belt transects. These 5 ft by 50 ft belts were placed randomly throughout the study areas. Total number of individuals by species were counted in each of the belt transects. The average number was then calculated followed by the number of individuals per acre.

Density of woody plant species of the Reference Area was recorded using the point quarter distance method (Cottom and

Curtis 1956). In this method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual.

Sample Adequacy

Sampling adequacy tests for woody species density and cover were performed using formulas from "Statistical Methods" (Snedocor and Cochran 1980), with the goal that at least 80% of the samples were within 10% of the true mean for the plant communities of the area. The formula used is given below.

$$nmin = \left[\frac{1.28\ (s)}{x\ (.1)}\right]^2$$

where,

nmin = minimum adequate sample
s = standard deviation
x = sample mean
.1 = confidence interval

However, sample size was also influenced proportionately by the total area of each sample site within a given reclaimed area. In other words, the larger the revegetated area, the larger the sample size.

Photographs

Color photographs of each sample area were taken at the time of sampling and submitted with this report.

Production

Total annual biomass was estimated by clipping, drying and weighing current annual productivity (in selected areas only). "Double sampling" using four quadrats around the clipped and weighed plot was accomplished.

Raw Data

The raw data were also submitted in the Appendix of this report which would facilitate future scrutiny of the data and further statistical testing if desired.

RESULTS

A road that had been reclaimed by the CO-OP Mining Company was sampled to monitor its current existing vegetation. This road was divided into four (4) sample areas: BTCA Nos. 1, 2, 4, & 5. BTCA Nos. 3, 6, 7, 8, 9, the Pond Drainage Areas (previously called "Slopes"), and the Residential Exclusion Area

were other previously disturbed areas that have been reseeded. These areas were also sampled. As previously mentioned, the Reference Area had been chosen earlier by representatives of the CO-OP Mining Company to be used as a standard for revegetation success.

BTCA 1

Total living cover of BTCA 1 was estimated at 40.50%. Grasses were the major lifeform in the area representing 55.65% of the living cover, followed by forbs (35.42%) and shrubs (8.93%). For total cover and composition of this area, refer to Table 1.

The most common grass species by frequency were bluebunch wheatgrass (*Agropyron spicatum*), intermediate wheatgrass (*Agropyron intermedium*), and Sandberg bluegrass (*Poa secunda*). Most common forb species were chickpea milkvetch (*Astragalus cicer*), yellow sweetclover (*Melilotus officinalis*) and Lewis flax (*Linum lewsii*). For cover and frequency by species, refer to Table 2.

Woody species density was estimated at 2,984 individuals per acre (Table 3).

BTCA 2

Total living cover of BTCA 2 was estimated at 32.50%. Grasses were also the major lifeform in the area representing 47.51% of the living cover. Shrubs and forbs, however, comprised nearly equal proportions of the living cover (Table 4).

The most common grass species by frequency were bluebunch wheatgrass and Sandberg bluegrass. Most common forbs species were Lewsii flax, chickpea milkvetch and alfalfa (*Medicago sativa*). A number of other desirable plant species were also represented in the quadrats (Table 5). The shrub, rubber rabbitbrush (*Chrysothamnus nauseosus*), was also common in the plots. This plant was estimated at 6.57% of the living cover was observed in 56.67% of the quadrats (Table 5).

Woody species density was estimated at 2,708 individuals per acre (Table 6).

BTCA 4

Total living cover of BTCA 4 was estimated at 33.33%. Grasses were again the major lifeform in the area, representing 57.41% of the living cover. Forbs comprised 26.58% and shrubs 16.02% of the cover (Table 7).

The most common grass species by frequency and cover were bluebunch wheatgrass and intermediate wheatgrass. Most common forbs species were nearly the same species as the areas above (Table 8). Rubber rabbitbrush was again common in the plots and was estimated at 5.56% of the living cover and was found in 50.00% of the quadrats (Table 8).

Woody species density was high at 4,378 individuals per acre (Table 9).

BTCA 5

Total living cover of BTCA 5 was estimated at 45.00%. Unlike the areas described above, forbs were the major lifeform in this area and represented 48.25% of the living cover, followed by shrubs and grasses (Table 10).

The most common forb species by cover and frequency were alfalfa and Lewis flax. They were observed in 80% and 90% of the sample quadrats, respectively. Most common shrubs species were rubber rabbitbrush and big sagebrush (*Artemisia tridentata*). For cover and frequency by species, refer to Table 11.

Woody species density was estimated at 8,494 individuals per acre (Table 12).

BTCA 6

Total living cover of BTCA 6 was estimated at 39.00%. The three lifeforms present - shrubs, forbs and grasses - were nearly equally represented in this sample area (Table 13). The area was, however, quite variable relative to plant species diversity, maturity of woody species, and composition. In other words, there was much diversity *within* the sample area (see color photograph). Random samples were taken over the entire area and subsequently consolidated. Therefore, the results reflect the "combined" average of this dissimilar area.

The most common grass species was thickspike wheatgrass (*Agropyron dasystachyum*). Most common forb was yellow sweetclover whereas, the most common shrub was rubber rabbitbrush. Table 14 shows the cover and frequencies of each plant species.

Woody species density was high when compared to the other sample areas. It had an estimated 11,700 individuals per acre (Table 15), many the result of recent germination.

Reference Area

The Reference Area chosen earlier to be a standard for future revegetation success was also sampled for comparisons.

The Reference Area had a total living cover at 31.00% (Table 16). Grasses also dominated the area, representing 65.57% of the total living cover, followed by woody species and forbs at 23.17% and 11.26%, respectively (Table 16).

The most common species, a grass, was Salina wildrye (*Elymus salinus*). No other plant species approached its importance by cover or frequency (Table 17). The most common woody species were corymb buckwheat (*Eriogonum corymbosum*) and pinyon pine (*Pinus edulis*).

Woody species density was estimated at 1,499 individuals per acre (Table 18). Total annual biomass productivity was calculated by clipping and weighing samples from the field. Results indicated the productivity to be 358.56 pound per acre (Table 19).

BTCA 3

Total living cover of BTCA 3 was estimated at 35.00%. Grasses again were the major lifeform in this area and represented 58.75% of the living cover, followed by shrubs and forbs (Table 20).

The most grass species by cover and frequency were bluebunch wheatgrass and thickspike wheatgrass. They were observed in 80%

and 70% of the sample quadrats, respectively. Most common shrubs species were rubber rabbitbrush and big sagebrush. For cover and frequency by species, refer to Table 21.

Woody species density was estimated at 7144 individuals per acre (Table 22).

BTCA 7/8

BTCA 7 and BTCA 8 were located in close proximity, with a road separating them. Because of their location, small size and monitoring history, they were sampled separately but their data were combined for the summary tables. Total living cover of BTCA 7/8 was estimated at 39.00%. Unlike many of the areas described above, shrubs were the major lifeform in this area and represented 48.48% of the living cover, followed by grasses and forbs (Table 23).

Clearly, the most common shrub species by cover and frequency was rubber rabbitbrush. It was observed in 90% of the sample quadrats. Most common grass species were thickspike and crested wheatgrasses. For cover and frequency by species, refer to Table 24.

Woody species density was estimated at 5,246 individuals per acre (Table 25).

BTCA 9

Total living cover of BTCA 9 was estimated at 48.00%. Grasses were again the major lifeform in this area and represented 67.76% of the living cover, followed by shrubs and forbs (Table 26).

The most common grass species by cover and frequency were bluebunch and thickspike wheatgrasses. They were observed in 86.67% and 80.00% of the sample quadrats, respectively. Most common shrubs species were rubber rabbitbrush and big sagebrush. For cover and frequency by species, refer to Table 27.

Woody species density was estimated at 8,494 individuals per acre (Table 28).

Pond Drainage Areas

The Pond Drainage Areas have been called reclaimed "slopes" in previous sample years. Total living cover here was estimated to be 39.80%, grasses representing the major lifeform (Table 29).

The most common grass species by cover and frequency were again thickspike and bluebunch wheatgrass, both were present in 84% of the quadrats. As many of the previous areas, most common shrubs species were rubber rabbitbrush and big sagebrush. For

cover and frequency by species, refer to Table 30.

Woody species density was estimated at 8,991 individuals per acre (Table 31).

Residential Exclusion Area

Total living cover of Residential Exclusion Area was estimated at 36.25%, with grass species the most common lifeform. Forb species followed in importance by cover and composition, represented 22.86% of the total living cover (Table 32).

Most common of the grass species by cover and frequency was intermediate wheatgrass. This species was present 100% of the quadrats (Table 33).

Woody species density was estimated at 1,355 individuals per acre (Table 34). Annual biomass production was also sampled, clipped and weighed in the laboratory. The total production was estimated to be 484.71 lbs. per acre (Table 35).

DISCUSSION

Statistical analyses were performed initially to compare the revegetated areas with the Reference Area. Because the

differences were obvious and significantly greater in favor of the revegetated area, these analyses were not reported in this document. Instead, figures were created to demonstrate more visually the differences between the areas.

Living cover and woody species density are the major parameters used by the State of Utah to compare revegetated areas with areas chosen as standards for success. Two other parameters - composition and diversity - are also compared in this report. A brief discussion about each sample parameter follows.

Cover

The total living cover was greater in each of the BTCA's and other areas when compared to the Reference Area (with the exception of BTCA 5). BTCA 5 had only slightly less living cover. Figs. 1 & 5 show the living cover of each area, including the Reference Area.

Composition

Composition, or the proportion of each lifeform relative to cover, varied somewhat in the BTCA's and other areas when compared to the Reference Area. Most of the areas, including the Reference Area were dominated by grasses. However, the revegetated areas generally had a greater proportion of woody

species and forbs. This difference could probably be considered a positive factor, suggesting greater species and wildlife habitat diversity. A comparison of the areas by composition is illustrated in Figs. 2 & 6.

Woody Species Density

Woody species density was significantly greater in almost all the BTCA's and other reclaimed areas when compared to the Reference Area. The exception was the Residential Exclusion area. Figs. 3 & 7 illustrates a comparison of these areas, including the Reference Area.

Species Diversity

As one measure of plant species diversity, the average number of species encountered in each sample quadrat can be calculated. Without exception, each of the revegetated areas had a greater number of species when compared to the Reference Area (Figs. 4 & 8). The species observed were nearly all "desirable" species, with very few "weedy" species. Although a few of the species were not native to the area (e.g. crested wheatgrass, intermediate wheatgrass and yellow sweetclover), all were valuable for wildlife habitat and preventing soil erosion. They were also adapted to the existing disturbances and aesthetically pleasing. *Mt. Nebo Scientific, Inc.* has been responsible for

monitoring the reclaimed sites (either qualitatively or quantitatively) since 1990. None of the established species appear to be over-competitive to the point of excluding all other species. Although a thorough year-by-year comparison has not been made for the context of this report, the sample results do not appear to indicate a decrease in diversity, productivity, woody species density or cover.

Summary

To briefly summarize, the vegetation of the reclaimed areas appear to be in healthy, diverse, and vigorous condition. Furthermore, the vegetation appears to be capable of maintaining productive, viable, and self-sustaining plant populations at least equal to the Reference Area previously chosen as a standard for revegetation success.

TABLE 1: Total cover and composition summary for BTCA 1 in Trail Canyon for the CO-OP Mining Company.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	40.50	3.50	10
Litter	17.00	6.40	10
Bareground	18.00	9.00	10
Rock	24.50	11.06	10
COMPOSITION			
Shrubs	8.93	11.32	10
Forbs	35.42	16.97	10
Grasses	55.65	20.16	10

TABLE 2: Species cover and frequency summary for BTCA 1 in Trail Canyon for the CO-OP Mining Company.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Artemisia tridentata	1.00	2.00	10	20.00
Chrysothamnus nauseosus	2.00	4.58	10	20.00
Pinus edulis	0.50	1.50	10	10.00
FORBS				
Artemisia ludoviciana	2.00	3.32	10	30.00
Astragalus cicer	4.50	7.89	10	30.00
Linum lewsii	4.80	5.04	10	60.00
Melilotus officinalis	2.70	2.37	10	60.00
GRASSES				
Agropyron cristatum	5.50	8.50	10	30.00
Agropyron dasystachyum	2.00	3.32	10	30.00
Agropyron intermedium	5.00	7.75	10	40.00
Agropyron spicatum	4.00	3.74	10	50.00
Oryzopsis hymenoides	1.50	2.29	10	30.00
Poa secunda	5.00	5.48	10	50.00

TABLE 3: Woody species densities of BTCA 1 in Trail Canyon for the CO-OP Mining Company.

	NUMBER/ACRE
Artemisia tridentata	1524.60
Chrysothamnus nauseosus	1219.68
Eriogonum corymbosum	239.58
TOTAL	2983.86

TABLE 4: Total cover and composition summary for BTCA 2 in Trail Canyon for the CO-OP Mining Company.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	32.50	11.31	30
Litter	8.33	4.71	30
Bareground	22.33	12.83	30
Rock	36.83	14.80	30
COMPOSITION			
Shrubs	27.17	23.68	30
Forbs	25.32	18.92	30
Grasses	47.51	27.52	30

TABLE 5: Species cover and frequency summary for BTCA 2 in Trail Canyon for the CO-OP Mining Company.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Artemisia tridentata	0.83	2.27	30	13.33
Chrysothamnus nauseosus	6.57	8.77	30	56.67
Eriogonum corymbosum	1.50	3.69	30	16.67
FORBS				
Achillea millefolium	0.17	0.90	30	3.33
Aster chilensis	0.17	0.90	30	3.33
Astragalus cicer	1.67	2.36	30	33.33
Halogeton glomeratus	0.17	0.90	30	3.33
Lappula occidentalis	0.17	0.90	30	3.33
Linus lewsii	3.33	5.22	30	43.33
Medicago sativa	1.33	3.14	30	20.00
Melilotus officinalis	0.50	1.50	30	10.00
Penstemon pachyphyllus	0.67	2.81	30	6.67
Salsola iberica	0.17	0.90	30	3.33
GRASSES				
Agropyron dasystachyum	0.83	3.67	30	6.67
Agropyron intermedium	2.17	4.95	30	26.67
Agropyron spicatum	5.93	10.26	30	43.33
Bromus tectorum	0.33	1.80	30	3.33
Oryzopsis hymenoides	0.33	1.25	30	3.33
Poa pratensis	0.33	1.80	30	3.33
Poa secunda	5.33	6.45	30	56.67

TABLE 6: Woody species densities of BTCA 2 in Trail Canyon for the CO-OP Mining Company.

	NUMBER/ACRE
Artemisia tridentata	293.72
Chrysothamnus nauseosus	2030.99
Eriogonum corymbosum	361.78
Pinus ponderosa	21.49
TOTAL	2707.98

TABLE 7: Total cover and composition summary for BTCA 4 in Trail Canyon for the CO-OP Mining Company.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	33.33	9.72	18
Litter	7.22	2.48	18
Bareground	34.17	15.12	18
Rock	25.28	10.34	18
COMPOSITION			
Shrubs	16.02	18.78	18
Forbs	26.58	26.22	18
Grasses	57.41	30.23	18

TABLE 8: Species cover and frequency summary for BTCA 4 in Trail Canyon for the CO-OP Mining Company.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Artemisia tridentata	0.28	1.15	18	5.56
Chrysothamnus nauseosus	5.56	7.43	18	50.00
FORBS				
Aster chilensis	0.28	1.15	18	5.56
Astragalus cicer	3.33	8.33	18	22.22
Linus lewsii	1.94	3.39	18	27.78
Medicago sativa	2.22	6.06	18	16.67
Melilotus officinalis	0.83	2.50	18	11.11
Penstemon palmeri	0.83	2.50	18	11.11
GRASSES				
Agropyron dasystachyum	4.44	10.26	18	22.22
Agropyron intermedium	2.78	4.48	18	33.33
Agropyron spicatum	4.17	5.83	18	44.44
Poa secunda	1.67	4.71	18	16.67
Sitanion hystrix	0.28	1.15	18	5.56
Oryzopsis hymendoides	4.72	6.76	18	38.89

TABLE 9: Woody species densities of BTCA 4 in Trail Canyon for the CO-OP Mining Company.

	NUMBER/ACRE
Artemisia tridentata	261.36
Chrysothamnus nauseosus	4101.90
Pinus ponderosa	14.52
TOTAL	4377.78

TABLE 10: Total cover and composition summary for BTCA 5 in Trail Canyon for the CO-OP Mining Company.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	45.00	4.47	10
Litter	9.50	6.10	10
Bareground	17.50	9.29	10
Rock	28.00	11.00	10
COMPOSITION			
Shrubs	26.80	18.07	10
Forbs	48.25	19.02	10
Grasses	24.94	12.72	10

TABLE 11: Species cover and frequency summary for BTCA 5 in Trail Canyon for the CO-OP Mining Company.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Artemisia tridentata	1.00	2.00	10	20.00
Chrysothamnus nauseosus	11.00	9.17	10	90.00
FORBS				
Linus lewsii	7.50	5.12	10	90.00
Medicago sativa	13.50	9.76	10	80.00
Penstemon palmeri	0.50	1.50	10	10.00
GRASSES				
Agropyron dasystachyum	1.00	2.00	10	20.00
Agropyron intermedium	2.00	2.45	10	40.00
Agropyron spicatum	8.00	6.78	10	70.00
Poa secunda	0.50	1.50	10	10.00

TABLE 12: Woody species densities of BTCA 5 in Trail Canyon for the CO-OP Mining Company.

	NUMBER/ACRE
Artemisia tridentata	130.68
Chrysothamnus nauseosus	8363.52
TOTAL	8494.20

TABLE 13: Total cover and composition summary for BTCA 6 in Trail Canyon for the CO-OP Mining Company.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	39.00	8.46	20
Litter	11.25	5.21	20
Bareground	29.00	11.25	20
Rock	20.75	10.52	20
COMPOSITION			
Shrubs	29.92	21.85	20
Forbs	33.11	23.35	20
Grasses	36.96	16.37	20

TABLE 14: Species cover and frequency summary for BTCA 6 in Trail Canyon for the CO-OP Mining Company.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Artemisia tridentata	2.20	2.91	20	40.00
Chrysothamnus nauseosus	10.90	2.91	20	40.00
FORBS				
Achillea millefolium	0.75	2.38	20	10.00
Aster chilensis	0.50	1.50	20	10.00
Astragalus cicer	0.25	1.09	20	5.00
Grindelia squarrosa	1.40	3.71	20	15.00
Linus lewsii	1.50	2.01	20	40.00
Medicago sativa	0.25	1.09	20	5.00
Melilotus officinalis	5.35	5.28	20	60.00
Penstemon palmeri	0.25	1.09	20	5.00
Salsola iberica	0.25	1.09	20	5.00
Sanquisorba minor	0.85	1.80	20	20.00
GRASSES				
Agropyron dasystachyum	6.25	4.71	20	85.00
Agropyron cristatum	2.50	4.03	20	35.00
Agropyron spicatum	4.40	4.16	20	15.00
Dactylis glomeratus	0.25	1.09	20	5.00
Elymus cinereus	1.15	4.02	20	10.00

TABLE 15: Woody species densities of BTCA 6 in Trail Canyon for the CO-OP Mining Company.

	NUMBER/ACRE
Ceratoides lanata	
Chrysothamnus nauseosus	5610.53
Eriogonum corymbosum	6072.27
Juniperus osteosperma	17.42
TOTAL	11700.22

TABLE 16: Total cover and composition summary for the Reference Area in Trail Canyon for the CO-OP Mining Company.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	31.00	8.46	20
Litter	16.00	8.00	20
Bareground	20.25	11.01	20
Rock	32.75	14.10	20
COMPOSITION			
Shrubs	23.17	30.55	20
Forbs	11.26	15.25	20
Grasses	65.57	30.36	20

TABLE 17: Species cover and frequency summary for the Reference Area in Trail Canyon for the CO-OP Mining Company.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Chrysothamnus nauseosus	0.12	0.44	20	5.00
Ephedra viridis	0.75	2.38	20	10.00
Eriogonum corymbosum	2.80	5.79	20	30.00
Juniperus scopulorum	1.50	6.54	20	5.00
Pinus edulis	2.00	8.72	20	5.00
Rosa woodsii	0.25	1.09	20	5.00
FORBS				
Artemisia dracunculoides	1.00	2.55	20	15.00
Aster foliaceus	0.25	1.09	20	5.00
Astragalus sp.	0.85	2.39	20	15.00
Erigeron engelmanii	1.00	2.55	20	15.00
Hymenoxys richardsonii	0.25	1.09	20	5.00
GRASSES				
Elymus salinus	20.25	11.45	20	90.00

TABLE 18: Woody species densities of the Reference Area in Trail Canyon for the CO-OP Mining Company.

	NUMBER/ACRE
Chrysothamnus nauseosus	181.50
Gutierrezia sarothrae	1076.90
Rosa woodsii	96.80
TOTAL	1499.30

TABLE 19: Biomass production of the Reference Area in Trail Canyon for the CO-OP Mining Company.

	LBS/ACRE		
	Mean	Std. Dev.	Samp. Size
Herbaceous Plants	232.50	161.98	20 (100)*
Woody Plants	127.13	164.25	20 (100)*
TOTAL	358.56	168.62	20 (100)*

Std. Dev. = Standard Deviation
Samp. Size = Sample Size

* Number in parentheses are the sample sizes when "double sampling" methods are considered.

TABLE 20: Total cover and composition summary for BTCA 3 (upper pad) in Trail Canyon for the CO-OP Mining Company.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	35.00	6.32	10
Litter	6.00	2.00	10
Bareground	30.00	10.95	10
Rock	29.00	15.78	10
COMPOSITION			
Shrubs	24.53	18.58	10
Forbs	16.72	12.27	10
Grasses	58.75	20.08	10

TABLE 21: Species cover and frequency summary for BTCA 3 in Trail Canyon for the CO-OP Mining Company.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Chrysothamnus nauseosus	7.50	4.61	10	90.00
Ceratoides lanata	0.50	1.50	10	10.00
FORBS				
Achillea millefolium	1.00	2.00	10	20.00
Linum lewsii	3.50	2.29	10	70.00
Melilotus officinalis	1.00	3.00	10	10.00
GRASSES				
Agropyron dasystachyum	7.50	6.80	10	70.00
Agropyron spicatum	8.00	6.40	10	80.00
Elymus cinereus	2.50	2.50	10	50.00
Oryzopsis hymenoides	3.50	6.34	10	30.00

TABLE 22: Woody species densities of BTCA 3 in Trail Canyon for the CO-OP Mining Company.

	NUMBER/ACRE
Artemisia tridentata	174.24
Chrysothamnus nauseosus	6969.60
TOTAL	7143.84

TABLE 23: Total cover and composition summary for BTCA 7/8 in Trail Canyon for the CO-OP Mining Company.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	39.00	8.75	20
Litter	11.75	6.18	20
Bareground	29.50	10.71	20
Rock	19.75	7.50	20
COMPOSITION			
Shrubs	48.48	25.94	20
Forbs	15.07	14.39	20
Grasses	36.45	30.44	20

TABLE 24: Species cover and frequency summary for BTCA 7/8 in Trail Canyon for the CO-OP Mining Company.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Artemisia tridentata	0.25	1.09	20	5.00
Chrysothamnus nauseosus	17.50	11.12	20	90.00
Eriogonum corymbosum				
Yucca harrimaniae	0.75	2.38	20	10.00
FORBS				
Grindelia spuarrosa	0.25	1.09	20	5.00
Medicago sativa	0.75	2.38	20	10.00
Melilotus officinalis	2.90	3.85	20	40.00
Opuntia polyacantha	0.25	1.09	20	5.00
Penstemon sp.	1.10	2.74	20	10.00
Salsola iberica	0.25	1.09	20	5.00
GRASSES				
Agropyron cristatum	4.25	6.94	20	30.00
Agropyron dasystachyum	7.25	8.87	20	50.00
Agropyron spicatum	1.00	4.36	20	5.00
Bromus carinatus	1.50	3.20	20	20.00
Elymus cinereus	0.25	1.09	20	5.00
Oryzopsis hymenoides	0.50	2.18	20	5.00
Stipa comata	0.25	1.09	20	5.00

TABLE 25: Woody species densities of BTCA 7/8 in Trail Canyon for the CO-OP Mining Company.

	NUMBER/ACRE
Chrysothamnus nauseosus	4207.74
Gutierrezia sarothrae	382.52
Opuntia polyacantha	54.65
Yucca harrimaniae	601.11
TOTAL	5246.02

TABLE 26: Total cover and composition summary for BTCA 9 in Trail Canyon for the CO-OP Mining Company.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	48.00	7.70	15
Litter	13.33	5.68	15
Bareground	22.67	9.29	15
Rock	16.00	6.63	15
COMPOSITION			
Shrubs	29.89	18.50	15
Forbs	2.36	4.79	15
Grasses	67.76	17.16	15

TABLE 27: Species cover and frequency summary for BTCA 9 in Trail Canyon for the CO-OP Mining Company.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Artemisia tridentata	1.00	2.71	15	20.00
Chrysothamnus nauseosus	14.00	10.20	15	93.33
FORBS				
Achillea millefolium	0.33	1.25	15	6.67
Kochia scoparia	0.33	1.25	15	6.67
Penstemon palmeri	0.33	1.25	15	6.67
GRASSES				
Agropyron cristatum	2.00	4.40	15	20.00
Agropyron dasystachyum	12.00	8.52	15	80.00
Agropyron spicatum	16.00	11.28	15	86.67
Elymus cinereus	2.00	4.00	15	20.00

TABLE 28: Woody species densities of BTCA 9 in Trail Canyon for the CO-OP Mining Company.

	NUMBER/ACRE
Artemisia tridentata	675.18
Chrysothamnus nauseosus	7623.00
Eriogonum corymbosum	196.02
TOTAL	8494.20

TABLE 29: Total cover and composition summary for the Pond Drainage Areas ("Slopes") in Trail Canyon for the CO-OP Mining Company.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	39.80	8.18	25
Litter	13.00	6.00	25
Bareground	22.71	7.63	25
Rock	24.80	8.54	25
COMPOSITION			
Shrubs	19.50	15.68	25
Forbs	8.08	15.82	25
Grasses	72.42	20.35	25

TABLE 30: Species cover and frequency summary for the Pond Drainage Areas ("Slopes") in Trail Canyon for the CO-OP Mining Company.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Artemisia tridentata	0.84	2.24	25	16.00
Chrysothamnus nauseosus	6.28	4.66	25	76.00
FORBS				
Artemisia dracunculus	0.20	0.98	25	4.00
Kochia scoparia	1.00	4.00	25	8.00
Melilotus officinalis	0.60	1.62	25	12.00
Penstemon palmeri	0.80	1.70	25	20.00
Sanquisorba minor	0.48	1.39	25	12.00
GRASSES				
Agropyron cristatum	1.60	5.24	25	12.00
Agropyron dasystachyum	12.20	10.30	25	84.00
Agropyron spicatum	11.60	10.07	25	84.00
Elymus cinereus	2.20	5.84	25	16.00
Elymus salinus	0.60	2.15	25	8.00
Oryzopsos hymenoides	1.40	4.36	25	12.00

TABLE 31: Woody species densities of the Pond Drainage Areas ("Slopes") in Trail Canyon for the CO-OP Mining Company.

	NUMBER/ACRE
Artemisia tridentata	836.35
Chrysothamnus nauseosus	8154.43
TOTAL	8990.78

TABLE 32: Total cover and composition summary for the Residential Exclusion Area in Trail Canyon for the CO-OP Mining Company.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Cover	36.25	6.50	20
Litter	29.25	11.54	20
Bareground	22.50	8.73	20
Rock	12.00	8.72	20
COMPOSITION			
Shrubs	6.69	11.69	20
Forbs	22.86	24.72	20
Grasses	70.45	24.76	20

TABLE 33: Species cover and frequency summary for the Residential Exclusion Area in Trail Canyon for the CO-OP Mining Company.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
TREES & SHRUBS				
Chrysothamnus nauseosus	0.75	2.38	20	5.00
Gutierrezia sarothrae	1.00	2.55	20	15.00
Rosa woodsii	0.25	1.09	20	5.00
Pinus ponderosa	0.25	1.09	20	15.00
FORBS				
Achillea millefolium				
Aster foliaceus	0.50	2.18	20	5.00
Astragalus cicer	5.25	9.55	20	30.00
Convolvulus arvensis	0.25	1.09	20	5.00
Erigeron sp.	0.25	1.09	20	5.00
Medicago sativa	0.25	1.09	20	5.00
Melilotus officinalis	2.00	2.92	20	35.00
GRASSES				
Agropyron intermedium	17.25	10.06	20	100.00
Bromus carinatus	6.50	7.60	20	55.00
Dactylis glomeratus	1.50	3.20	20	20.00
Elymus salinus	0.25	1.09	20	5.00

TABLE 34: Woody species densities of the Residential Exclusion Area in Trail Canyon for the CO-OP Mining Company.

	NUMBER/ACRE
Chrysothamnus nauseosus	181.50
Gutierrezia sarothrae	1076.90
Rosa woodsii	96.80
TOTAL	1355.20

TABLE 35: Biomass production of the Residential Exclusion Area in Trail Canyon for the CO-OP Mining Company.

	LBS/ACRE		
	Mean	Std. Dev.	Samp. Size
Herbaceous Plants	467.62	205.49	20 (100)*
Woody Plants	16.64	53.19	20 (100)*
TOTAL	484.71	210.32	20 (100)*

Std. Dev. = Standard Deviation
Samp. Size = Sample Size

* Number in parentheses are the sample sizes when "double sampling" methods are considered.

FIG. 1: 1993 - Understory Cover for the BTCA Areas

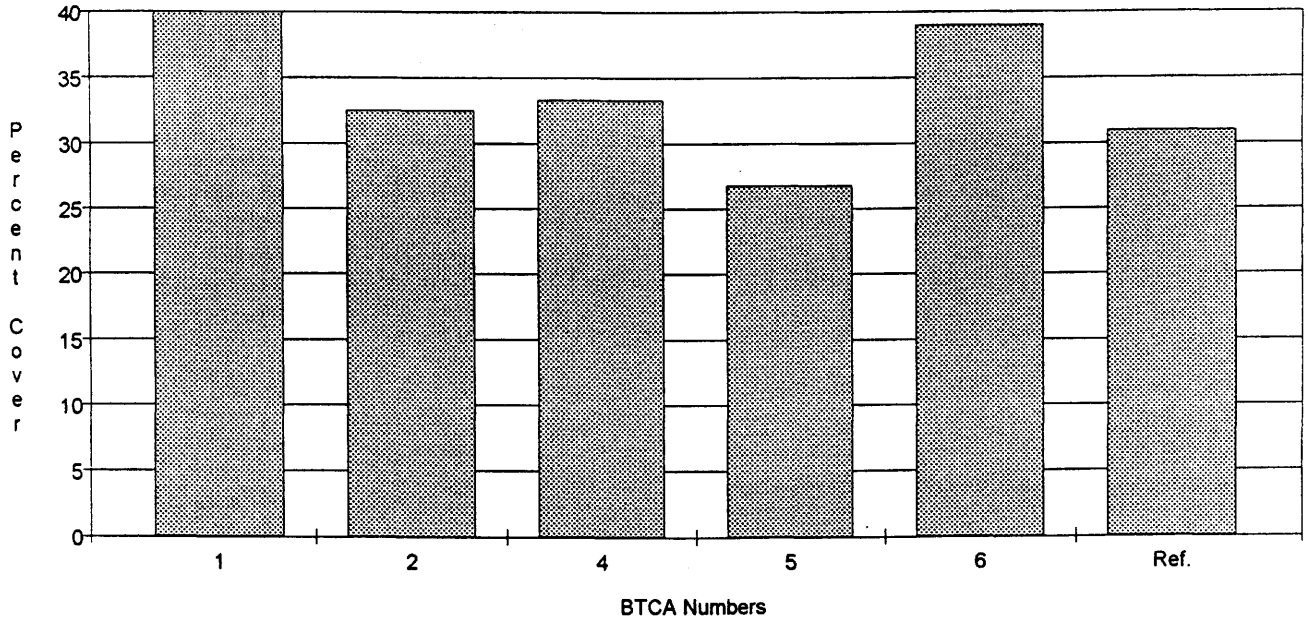


FIG. 2: 1993 - Lifeform Composition of the BTCA Areas

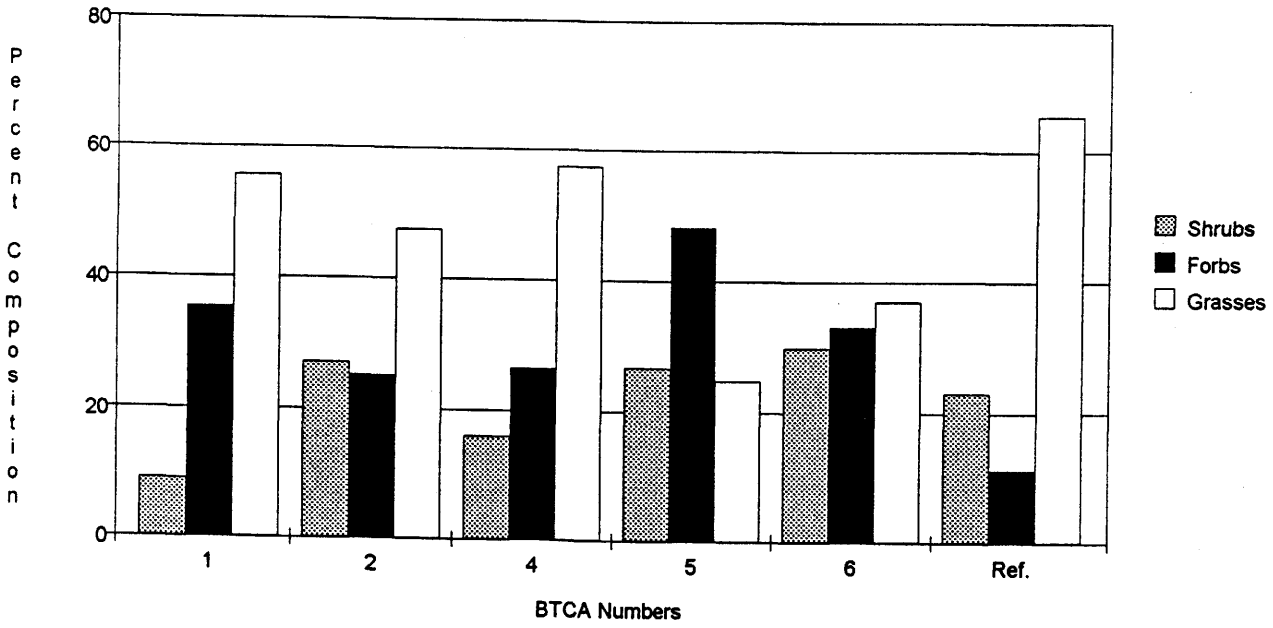


FIG. 3: 1993 - Woody Species Density of the BTCA Areas

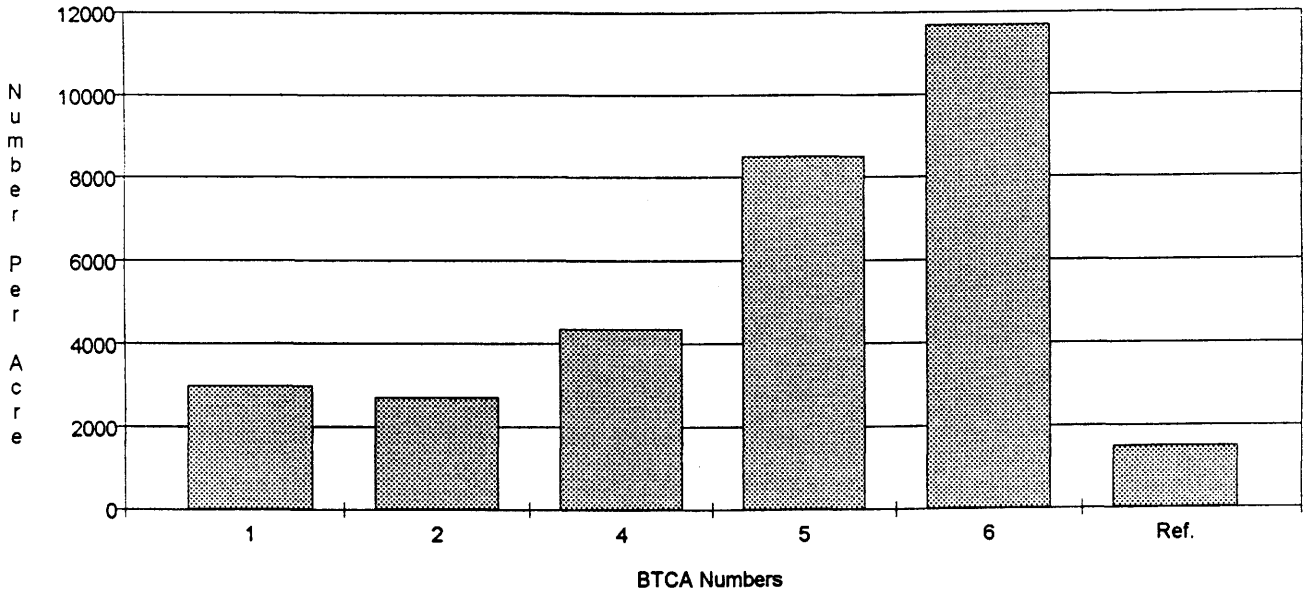


FIG. 4: 1993 - Species Diversity of the BTCA Areas

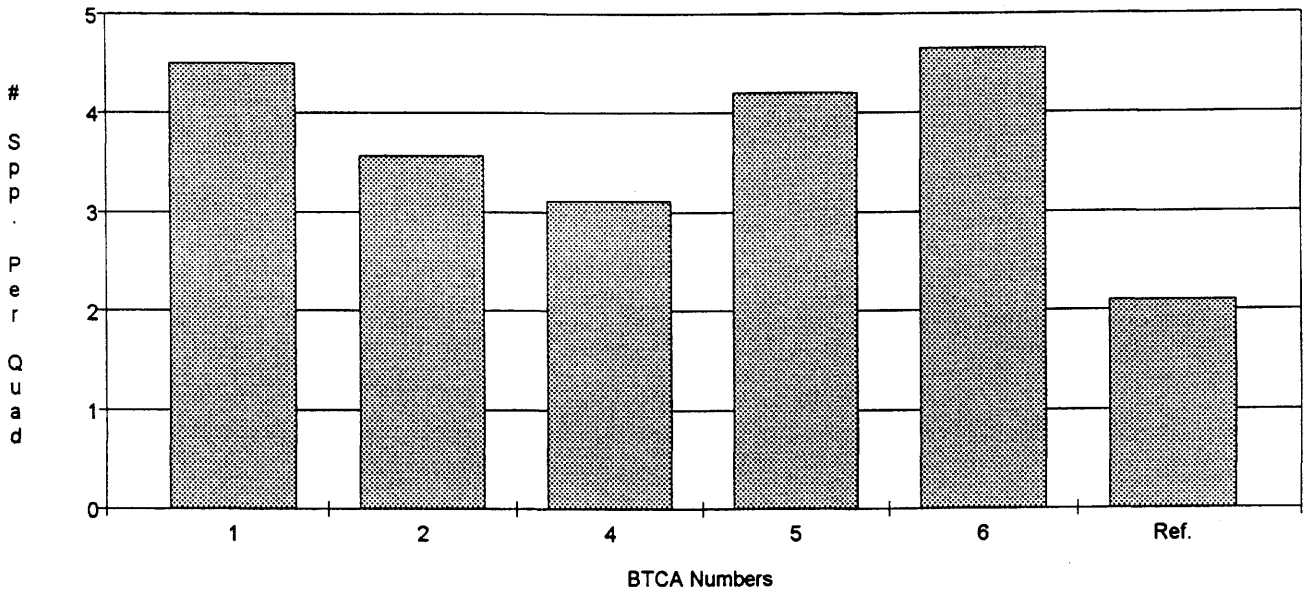


FIG. 5: 1993 - Understory Cover for the BTCA & Other Areas

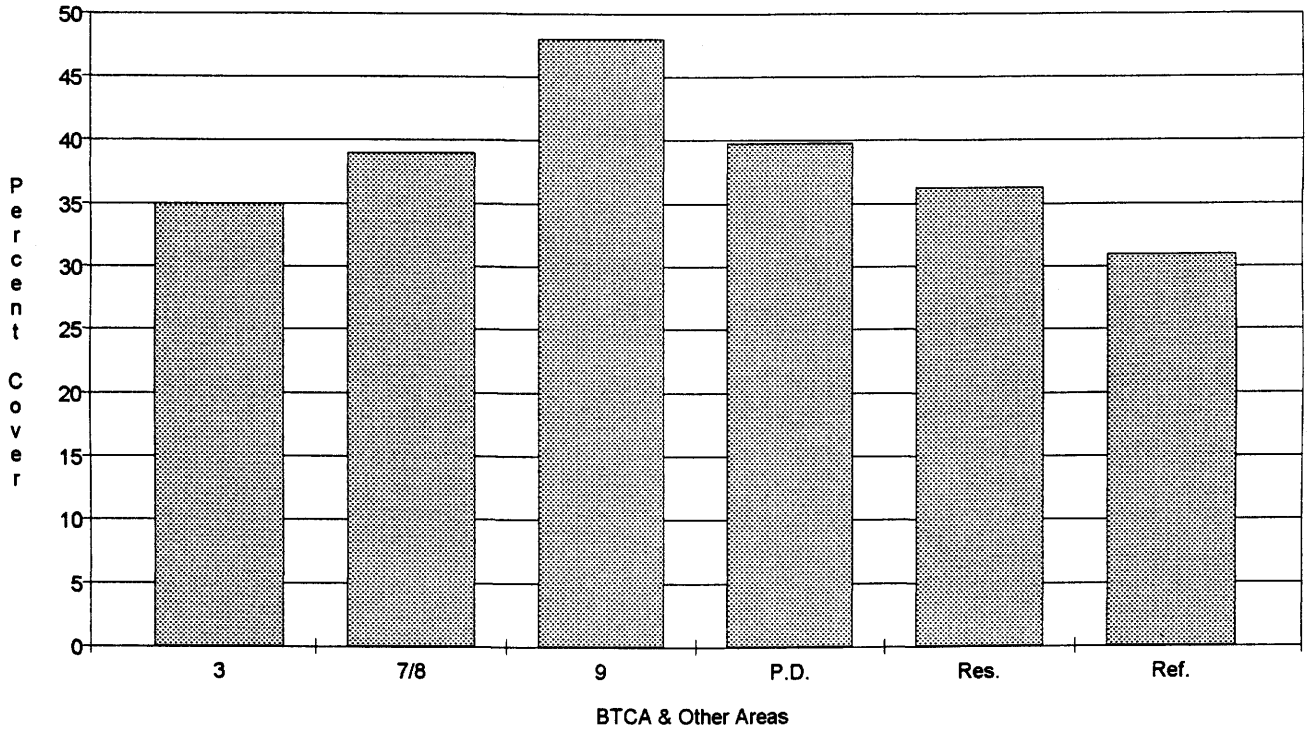


FIG. 6: 1993 - Lifeform Composition of BTCA & Other Areas

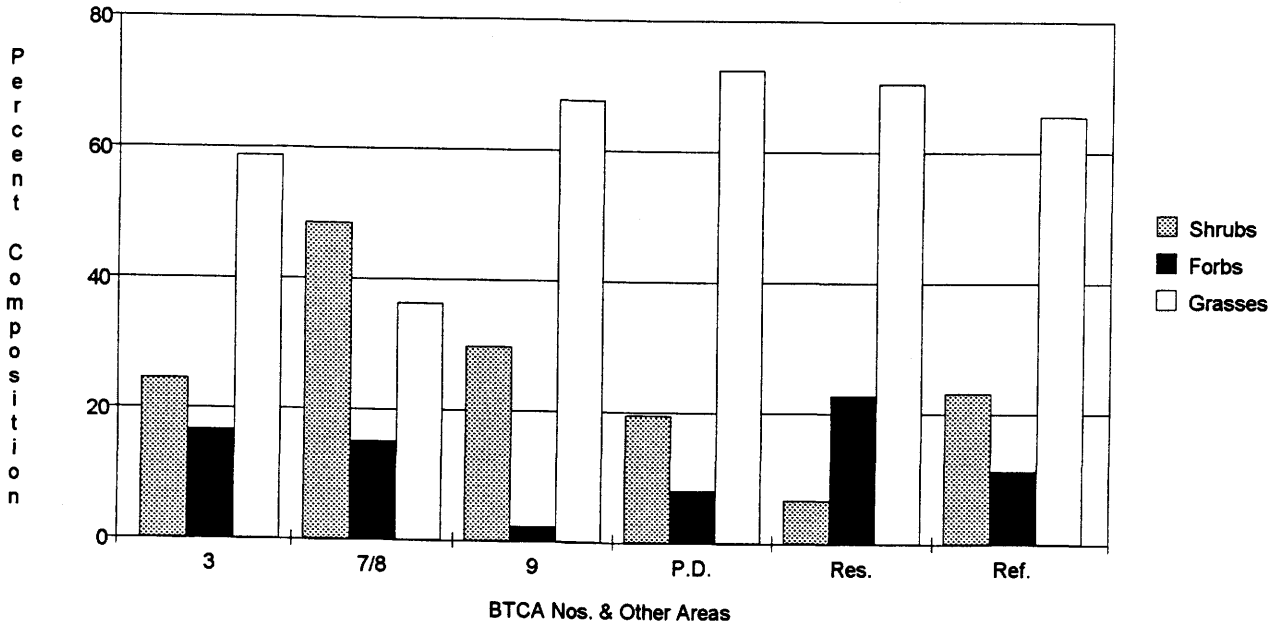


FIG. 7: 1993 - Woody Species Density of BTCA & Other Areas

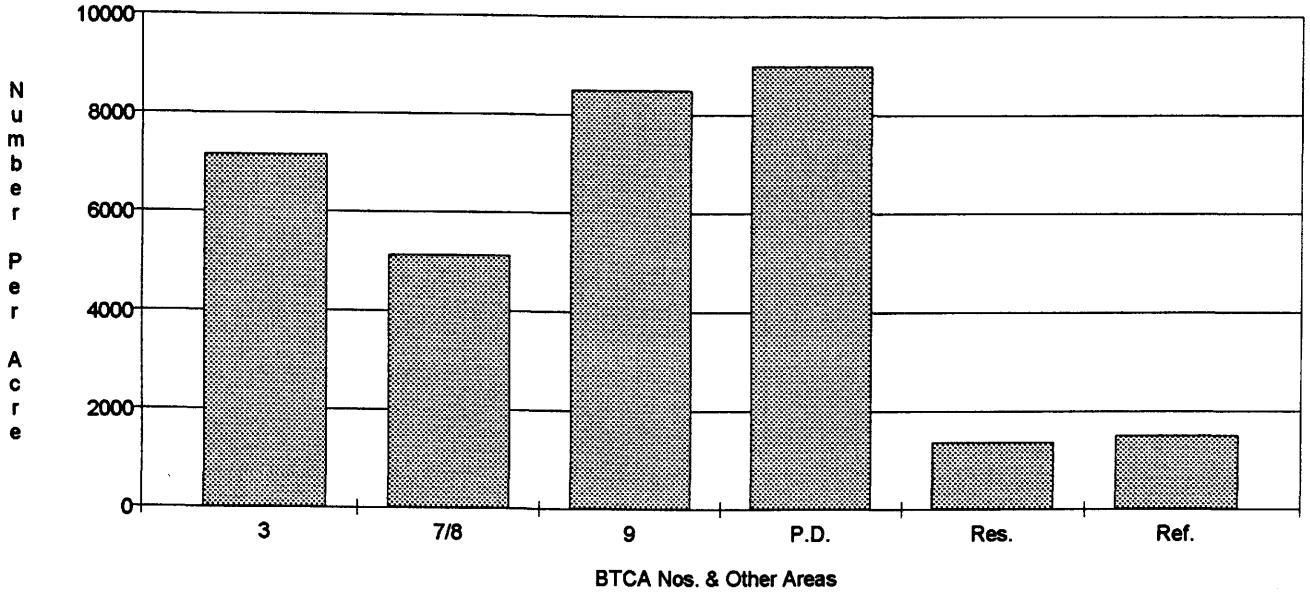
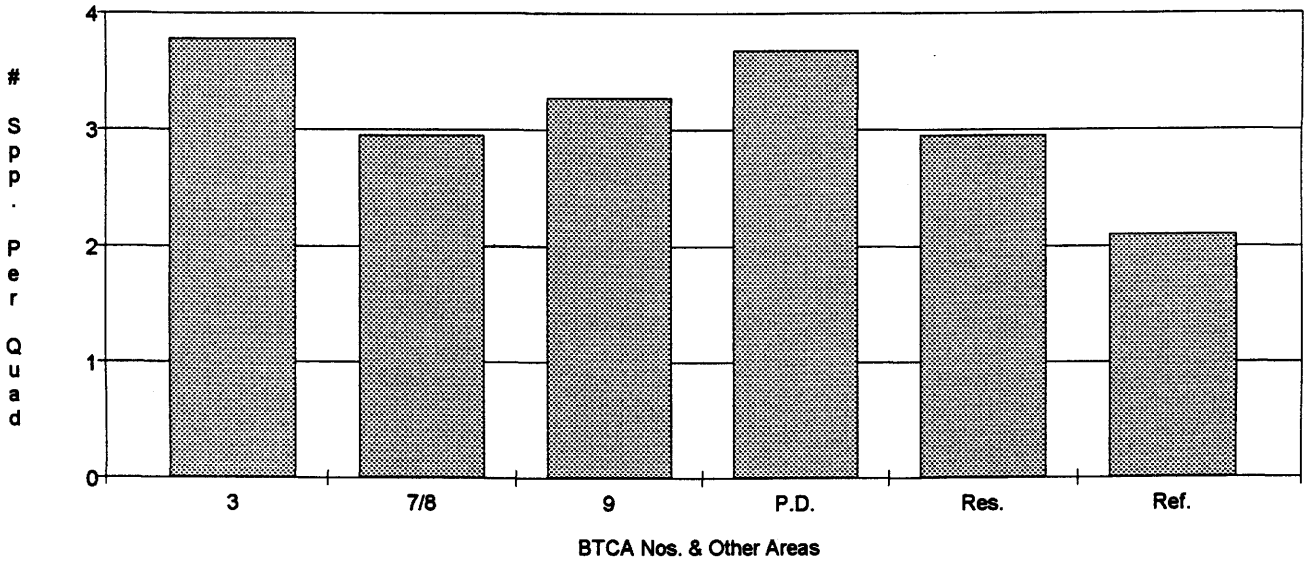


FIG. 8: 1993 - Species Diversity of BTCA & Other Areas



COLOR PHOTOGRAPHS

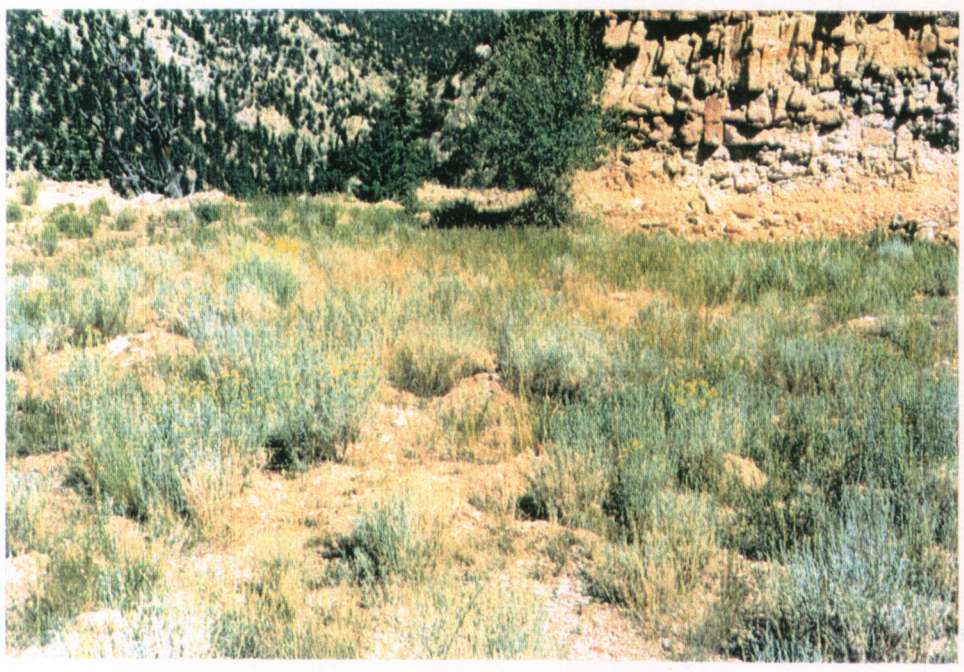
BTCA 1

BTCA 2 (a)

BTCA 2 (b)

BTCA 4 (a)

BTCA 4 (b)



BTCA 5

BTCA 6

Trail Canyon Reference Area.

BTCA 3

BTCA 7

BTCA 8

BTCA 9

Pond Drainage Areas

Residential Exclusion Area

Trail Canyon Reference Area

CO-OP MINE
Trail Canyon
BTCA 1 - Reclaimed Road
Exposure:
Slope:

Sample Date: 9 Sept 1993	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
TREES & SHRUBS										
Chrysothamnus nauseosus	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	15.00	0.00
Artemisia tridentata	0.00	0.00	0.00	5.00	5.00	0.00	0.00	0.00	0.00	0.00
Pinus edulis	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS										
Artemisia ludoviciana	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	5.00	10.00
Astragalus cicer	20.00	5.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Melilotus officinalis	0.00	2.00	5.00	5.00	5.00	5.00	5.00	0.00	0.00	0.00
Linum lewsii	0.00	3.00	0.00	10.00	15.00	0.00	0.00	5.00	10.00	5.00
GRASSES										
Poa secunda	0.00	0.00	0.00	5.00	10.00	0.00	10.00	10.00	0.00	15.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	5.00	5.00
Agropyron dasystachyum	5.00	0.00	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Agropyron intermedium	10.00	25.00	5.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
Agropyron spicatum	0.00	0.00	0.00	5.00	5.00	5.00	0.00	10.00	5.00	10.00
Agropyron cristatum	0.00	0.00	0.00	0.00	0.00	20.00	15.00	20.00	0.00	0.00
COVER										
Total Living Cover	35.00	40.00	40.00	35.00	40.00	45.00	40.00	45.00	40.00	45.00
Litter	15.00	25.00	25.00	20.00	5.00	10.00	20.00	20.00	20.00	10.00
Bareground	40.00	25.00	25.00	15.00	10.00	15.00	15.00	10.00	15.00	10.00
Rock	10.00	10.00	10.00	30.00	45.00	30.00	25.00	25.00	25.00	35.00
% COMPOSITION										
Shrubs	0.00	12.50	0.00	14.29	12.50	0.00	12.50	0.00	37.50	0.00
Forbs	57.14	25.00	62.50	42.86	50.00	22.22	12.50	11.11	37.50	33.33
Grasses	42.86	62.50	37.50	42.86	37.50	77.78	75.00	88.89	25.00	66.67

CO-OP MINE
Trail Canyon
BTCA 1 - Reclaimed Road
Exposure:
Slope:
Sample Date: 9 Sept 1993

Mean	SDev	Freq	
			TREES & SHRUBS
2.00	4.58	20.00	Chrysothamnus nauseosus
1.00	2.00	20.00	Artemisia tridentata
0.50	1.50	10.00	Pinus edulis
			FORBS
2.00	3.32	30.00	Artemisia ludoviciana
4.50	7.89	30.00	Astragalus cicer
2.70	2.37	60.00	Melilotus officinalis
4.80	5.04	60.00	Linum lewsii
			GRASSES
5.00	5.48	50.00	Poa secunda
1.50	2.29	30.00	Stipa hymenoides
2.00	3.32	30.00	Agropyron dasystachyum
5.00	7.75	40.00	Agropyron intermedium
4.00	3.74	50.00	Agropyron spicatum
5.50	8.50	30.00	Agropyron cristatum
			COVER
40.50	3.50		Total Living Cover
17.00	6.40		Litter
18.00	9.00		Bareground
24.50	11.06		Rock
			% COMPOSITION
8.93	11.32		Shrubs
35.42	16.97		Forbs
55.65	20.16		Grasses

CO-OP MINE
Trail Canyon
BTCA 2 - Reclaimed Road
Exposure: SW
Slope: 1 - 5 deg

Sample Date: 9 Sept 1993	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
TREES & SHRUBS										
Artemisia tridentata	5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eriogonum corymbosum	0.00	0.00	0.00	0.00	5.00	10.00	0.00	0.00	0.00	5.00
Chrysothamnus nauseosus	5.00	0.00	10.00	5.00	10.00	15.00	5.00	0.00	25.00	15.00
FORBS										
Lappula occidentalis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Achillea millefolium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Penstemon pachyphyllus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Salsola iberica	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Medicago sativa	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	5.00	0.00
Aster chilensis	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Astagalus cicer	5.00	5.00	5.00	5.00	0.00	0.00	0.00	5.00	0.00	5.00
Linus lewsii	10.00	5.00	5.00	0.00	0.00	0.00	5.00	0.00	20.00	5.00
Melilotus officinalis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
Halogeton glomeratus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES										
Poa secunda	15.00	5.00	0.00	15.00	15.00	0.00	0.00	5.00	0.00	5.00
Poa pratensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agropyron spicatum	0.00	15.00	10.00	5.00	0.00	0.00	0.00	15.00	10.00	0.00
Agropyron dasystachyum	0.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00
Agropyron intermedium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	5.00
Bromus tectorum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COVER										
Total Living Cover	40.00	30.00	40.00	30.00	30.00	30.00	35.00	35.00	60.00	50.00
Litter	10.00	5.00	10.00	5.00	5.00	5.00	10.00	5.00	10.00	10.00
Bareground	45.00	30.00	15.00	40.00	15.00	30.00	25.00	35.00	5.00	5.00
Rock	5.00	35.00	35.00	25.00	50.00	35.00	30.00	25.00	25.00	35.00
% COMPOSITION										
Shrubs	25.00	0.00	37.50	16.67	50.00	83.33	14.29	0.00	41.67	40.00
Forbs	37.50	33.33	37.50	16.67	0.00	16.67	28.57	28.57	41.67	40.00
Grasses	37.50	66.67	25.00	66.67	50.00	0.00	57.14	71.43	16.67	20.00

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00
0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	7.00	10.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
0.00	5.00	0.00	0.00	25.00	5.00	5.00	0.00	10.00	0.00	5.00	15.00
10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	20.00	10.00	0.00	50.00	20.00	0.00	0.00	8.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	5.00	5.00	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25.00	25.00	25.00	30.00	40.00	60.00	30.00	25.00	20.00	20.00	20.00	25.00
5.00	5.00	5.00	5.00	10.00	5.00	15.00	5.00	5.00	5.00	5.00	10.00
10.00	15.00	15.00	25.00	35.00	15.00	25.00	45.00	45.00	40.00	20.00	20.00
60.00	55.00	55.00	40.00	15.00	20.00	30.00	25.00	30.00	35.00	55.00	45.00
60.00	20.00	0.00	33.33	0.00	0.00	0.00	20.00	50.00	35.00	50.00	20.00
0.00	40.00	0.00	16.67	12.50	0.00	16.67	80.00	0.00	25.00	25.00	20.00
40.00	40.00	100.00	50.00	87.50	100.00	83.33	0.00	50.00	40.00	25.00	60.00

23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	10.00	15.00	0.00	40.00	10.00	5.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.00	5.00	0.00	0.00	0.00	5.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.00
0.00	5.00	20.00	0.00	5.00	0.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	15.00	0.00	0.00	5.00	5.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	25.00	0.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	0.00	0.00	5.00
25.00	30.00	50.00	25.00	50.00	20.00	20.00	30.00
5.00	5.00	25.00	10.00	20.00	10.00	10.00	10.00
5.00	5.00	5.00	10.00	10.00	25.00	30.00	25.00
65.00	60.00	20.00	55.00	20.00	45.00	40.00	35.00
0.00	33.33	30.00	0.00	80.00	50.00	25.00	0.00
60.00	33.33	40.00	0.00	10.00	25.00	25.00	50.00
40.00	33.33	30.00	100.00	10.00	25.00	50.00	50.00

CO-OP MINE
Trail Canyon
BTCA 2 - Reclaimed Road
Exposure: SW
Slope: 1 - 5 deg
Sample Date: 9 Sept 1993

Mean	SDev	Freq	
			TREES & SHRUBS
0.83	2.27	13.33	Artemisia tridentata
1.50	3.69	16.67	Eriogonum corymbosum
6.57	8.77	56.67	Chrysothamnus nauseosus
			FORBS
0.17	0.90	3.33	Lappula occidentalis
0.17	0.90	3.33	Achillea millefolium
0.67	2.81	6.67	Penstemon pachyphyllus
0.17	0.90	3.33	Salsola iberica
1.33	3.14	20.00	Medicago sativa
0.17	0.90	3.33	Aster chilensis
1.67	2.36	33.33	Astagalus cicer
3.33	5.22	43.33	Linus lewsii
0.50	1.50	10.00	Melilotus officinalis
0.17	0.90	3.33	Halogeton glomeratus
			GRASSES
5.33	6.45	56.67	Poa secunda
0.33	1.80	3.33	Poa pratensis
5.93	10.26	43.33	Agropyron spicatum
0.83	3.67	6.67	Agropyron dasystachyum
2.17	4.95	26.67	Agropyron intermedium
0.33	1.80	3.33	Bromus tectorum
0.33	1.25	3.33	Stipa hymenoides

		COVER
32.50	11.31	Total Living Cover
8.33	4.71	Litter
22.33	12.83	Bareground
36.83	14.80	Rock
		% COMPOSITION
27.17	23.68	Shrubs
25.32	18.92	Forbs
47.51	27.52	Grasses

CO-OP MINE
Trial Canyon
BTCA 4 - Reclaimed Road
Exposure: S
Slope: 0 - 3 deg

Sample Date: 9 Sept 1993	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00
TREES & SHRUBS											
Chrysothamnus nauseosus	5.00	0.00	0.00	20.00	5.00	10.00	5.00	10.00	15.00	5.00	25.00
Artemisia tridentata	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
FORBS											
Linum lewsii	5.00	0.00	0.00	0.00	10.00	0.00	0.00	10.00	5.00	0.00	0.00
Medicago sativa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
Astragalus cicer	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	10.00	0.00
Penstemon palmeri	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	10.00
Melilotus officinalis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
Aster chilensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES											
Agropyron spicatum	5.00	0.00	15.00	0.00	0.00	0.00	20.00	0.00	5.00	0.00	10.00
Poa secunda	5.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	5.00	0.00
Agropyron intermedium	15.00	0.00	10.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Sitanion hystrix	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stipa hymendoides	0.00	20.00	0.00	20.00	0.00	0.00	0.00	10.00	0.00	10.00	0.00
Agropyron dasystachyum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
COVER											
Total Living Cover	40.00	20.00	25.00	40.00	15.00	35.00	30.00	40.00	40.00	40.00	45.00
Litter	5.00	5.00	5.00	10.00	5.00	10.00	10.00	5.00	5.00	5.00	10.00
Bareground	40.00	70.00	45.00	25.00	55.00	40.00	25.00	30.00	50.00	30.00	15.00
Rock	15.00	5.00	25.00	25.00	25.00	15.00	35.00	25.00	5.00	25.00	30.00
% COMPOSITION											
Shrubs	12.50	0.00	0.00	50.00	33.33	28.57	33.33	25.00	37.50	12.50	55.56
Forbs	12.50	0.00	0.00	0.00	66.67	14.29	0.00	37.50	25.00	50.00	22.22
Grasses	75.00	100.00	100.00	50.00	0.00	57.14	66.67	37.50	37.50	37.50	22.22

CO-OP MINE
Trial Canyon
BTCA 4 - Reclaimed Road
Exposure: S
Slope: 0 - 3 deg
Sample Date: 9 Sept 1993

12.00	13.00	14.00	15.00	16.00	17.00	18.00	Mean	SDev	Freq	
										TREES & SHRUBS
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.56	7.43	50.60	Chrysothamnus nauseosus
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	1.15	5.56	Artemisia tridentata
										FORBS
0.00	0.00	0.00	0.00	0.00	5.00	0.00	1.94	3.39	27.78	Linum lewsii
0.00	0.00	0.00	10.00	0.00	0.00	25.00	2.22	6.06	16.67	Medicago sativa
0.00	35.00	0.00	10.00	0.00	0.00	0.00	3.33	8.33	22.22	Astragalus cicer
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83	2.50	11.11	Penstemon palmeri
0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.83	2.50	11.11	Melilotus officinalis
0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.28	1.15	5.56	Aster chilensis
										GRASSES
0.00	0.00	5.00	5.00	0.00	0.00	10.00	4.17	5.83	44.44	Agropyron spicatum
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67	4.71	16.67	Poa secunda
5.00	0.00	0.00	5.00	0.00	0.00	10.00	2.78	4.48	33.33	Agropyron intermedium
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	1.15	5.56	Sitanion hystrix
10.00	0.00	10.00	5.00	0.00	0.00	0.00	4.72	6.76	38.89	Stipa hymendoides
0.00	5.00	0.00	0.00	35.00	30.00	0.00	4.44	10.26	22.22	Agropyron dasystachyum
										COVER
15.00	40.00	20.00	35.00	35.00	40.00	45.00	33.33	9.72		Total Living Cover
5.00	5.00	5.00	10.00	10.00	10.00	10.00	7.22	2.48		Litter
35.00	35.00	45.00	20.00	30.00	20.00	5.00	34.17	15.12		Bareground
45.00	20.00	30.00	35.00	25.00	30.00	40.00	25.28	10.34		Rock
										% COMPOSITION
0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.02	18.78		Shrubs
0.00	87.50	25.00	57.14	0.00	25.00	55.56	26.58	26.22		Forbs
100.00	12.50	75.00	42.86	100.00	75.00	44.44	57.41	30.23		Grasses

CO-OP MINE
Trail Canyon
BTCA 5 - Reclaimed Road End
Exposure: SE
Slope: 1 - 3 deg

Sample Date: 9 Sept 1993	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
TREES & SHRUBS										
Chrysothamnus nauseosus	15.00	25.00	30.00	5.00	5.00	0.00	10.00	10.00	5.00	5.00
Artemisia tridentata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.00
FORBS										
Penstemon palmeri	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Linum lewsii	5.00	5.00	10.00	10.00	5.00	10.00	5.00	0.00	5.00	20.00
Medicago sativa	10.00	0.00	0.00	10.00	20.00	30.00	25.00	20.00	15.00	5.00
GRASSES										
Poa secunda	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agropyron spicatum	15.00	5.00	0.00	20.00	15.00	10.00	0.00	10.00	5.00	0.00
Agropyron intermedium	0.00	5.00	5.00	0.00	0.00	0.00	0.00	5.00	5.00	0.00
Agropyron dasystachyum	0.00	0.00	0.00	0.00	5.00	0.00	5.00	0.00	0.00	0.00
COVER										
Total Living Cover	45.00	45.00	50.00	45.00	50.00	50.00	45.00	45.00	40.00	35.00
Litter	10.00	5.00	5.00	5.00	25.00	5.00	10.00	10.00	15.00	5.00
Bareground	10.00	10.00	10.00	5.00	10.00	25.00	25.00	35.00	20.00	25.00
Rock	35.00	40.00	35.00	45.00	15.00	20.00	20.00	10.00	25.00	35.00
% COMPOSITION										
Shrubs	33.33	55.56	60.00	11.11	10.00	0.00	22.22	22.22	25.00	28.57
Forbs	33.33	22.22	20.00	44.44	50.00	80.00	66.67	44.44	50.00	71.43
Grasses	33.33	22.22	20.00	44.44	40.00	20.00	11.11	33.33	25.00	0.00

CO-OP MINE
Trail Canyon
BTCA 5 - Reclaimed Road End
Exposure: SE
Slope: 1 - 3 deg
Sample Date: 9 Sept 1993

Mean	SDev	Freq	
			TREES & SHRUBS
11.00	9.17	90.00	Chrysothamnus nauseosus
1.00	2.00	20.00	Artemisia tridentata
			FORBS
0.50	1.50	10.00	Penstemon palmeri
7.50	5.12	90.00	Linum lewsii
13.50	9.76	80.00	Medicago sativa
			GRASSES
0.50	1.50	10.00	Poa secunda
8.00	6.78	70.00	Agropyron spicatum
2.00	2.45	40.00	Agropyron intermedium
1.00	2.00	20.00	Agropyron dasystachyum

		COVER
45.00	4.47	Total Living Cover
9.50	6.10	Litter
17.50	9.29	Bareground
28.00	11.00	Rock
		% COMPOSITION
26.80	18.07	Shrubs
48.25	19.02	Forbs
24.94	12.72	Grasses

CO-OP MINE
Trail Canyon
BTCA 6 - Lower Pad
Exposure: W
Slope: 0 - 2 deg

Sample Date: 15 Sept 1993	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
TREES & SHRUBS										
Chrysothamnus nauseosus	25.00	20.00	25.00	40.00	3.00	10.00	0.00	0.00	0.00	0.00
Artemisia tridentata	0.00	0.00	0.00	0.00	2.00	0.00	5.00	0.00	7.00	5.00
FORBS										
Salsola iberica	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Penstemon palmeri	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Linum lewsii	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	5.00	3.00
Medicago sativa	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Melilotus officinalis	0.00	0.00	0.00	0.00	5.00	0.00	15.00	10.00	10.00	10.00
Aster chilensis	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Astragalus cicer	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sanquisorba minor	0.00	5.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	2.00
Achillea millefolium	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Grindelia squarrosa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	8.00	0.00
GRASSES										
Agropyron dasystachyum	5.00	15.00	5.00	5.00	5.00	5.00	5.00	20.00	5.00	5.00
Elymus cinereus	5.00	0.00	0.00	0.00	18.00	0.00	0.00	0.00	0.00	0.00
Agropyron spicatum	15.00	0.00	5.00	5.00	0.00	5.00	5.00	0.00	0.00	5.00
Dactylis glomeratus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agropyron cristatum	0.00	0.00	10.00	5.00	5.00	15.00	0.00	0.00	0.00	0.00
COVER										
Total Living Cover	50.00	45.00	50.00	60.00	40.00	40.00	35.00	35.00	35.00	35.00
Litter	10.00	10.00	10.00	5.00	5.00	10.00	10.00	25.00	25.00	10.00
Bareground	35.00	20.00	35.00	20.00	30.00	25.00	20.00	25.00	15.00	30.00
Rock	5.00	25.00	5.00	15.00	25.00	25.00	35.00	15.00	25.00	25.00
% COMPOSITION										
Shrubs	50.00	44.44	50.00	66.67	12.50	25.00	14.29	0.00	20.00	14.29
Forbs	0.00	22.22	10.00	8.33	17.50	12.50	57.14	42.86	65.71	57.14
Grasses	50.00	33.33	40.00	25.00	70.00	62.50	28.57	57.14	14.29	28.57

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
0.00	0.00	0.00	0.00	0.00	0.00	15.00	15.00	30.00	35.00
0.00	0.00	7.00	8.00	5.00	5.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
0.00	2.00	3.00	5.00	5.00	5.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	10.00	15.00	2.00	10.00	10.00	0.00	5.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	10.00	5.00	0.00	5.00	0.00	10.00	10.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3.00	0.00	5.00	5.00	0.00	10.00	5.00	10.00	10.00
5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	5.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
35.00	30.00	30.00	30.00	35.00	25.00	40.00	35.00	45.00	50.00
15.00	10.00	5.00	10.00	15.00	10.00	10.00	10.00	10.00	10.00
35.00	55.00	60.00	30.00	35.00	20.00	25.00	25.00	20.00	20.00
15.00	5.00	5.00	30.00	15.00	45.00	25.00	30.00	25.00	20.00
0.00	0.00	23.33	26.67	14.29	20.00	37.50	42.86	66.67	70.00
57.14	40.00	60.00	56.67	57.14	60.00	12.50	14.29	11.11	0.00
42.86	60.00	16.67	16.67	28.57	20.00	50.00	42.86	22.22	30.00

CO-OP MINE
Trail Canyon
BTCA 6 - Lower Pad
Exposure: W
Slope: 0 - 2 deg
Sample Date: 15 Sept 1993

Mean	SDev	Freq	
			TREES & SHRUBS
10.90	13.34	50.00	Chrysothamnus nauseosus
2.20	2.91	40.00	Artemisia tridentata
			FORBS
0.25	1.09	5.00	Salsola iberica
0.25	1.09	5.00	Penstemon palmeri
1.50	2.01	40.00	Linum lewsii
0.25	1.09	5.00	Medicago sativa
5.35	5.28	60.00	Melilotus officinalis
0.50	1.50	10.00	Aster chilensis
0.25	1.09	5.00	Astragalus cicer
0.85	1.80	20.00	Sanquisorba minor
0.75	2.38	10.00	Achillea millefolium
1.40	3.71	15.00	Grindelia squarrosa
			GRASSES
6.25	4.71	86.00	Agropyron dasystachyum
1.15	4.02	10.00	Elymus cinereus
4.40	4.16	65.00	Agropyron spicatum
0.25	1.09	5.00	Dactylis glomeratus
2.50	4.03	35.00	Agropyron cristatum

		COVER
39.00	8.46	Total Living Cover
11.25	5.21	Litter
29.00	11.25	Bareground
20.75	10.52	Rock
		% COMPOSITION
29.92	21.85	Shrubs
33.11	23.35	Forbs
36.96	16.37	Grasses

CO-OP MINE
Trail Canyon
PJ Reference Area
Exposure: E
Slope: 30 deg.

Sample Date: 22 July 1993	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
TREES & SHRUBS										
Chrysothamnus nauseosus	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Eriogonum corymbosum	8.00	0.00	5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Rosa woodsii	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ephedra viridis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pinus edulis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Juniperus scopulorum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS										
Aster foliaceus	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Artemisia dracunculoides	0.00	0.00	5.00	5.00	10.00	0.00	0.00	0.00	0.00	0.00
Hymenoxys richardsonii	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Erigeron engelmanii	0.00	0.00	0.00	0.00	0.00	0.00	5.00	10.00	5.00	0.00
Astragalus sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00
GRASSES										
Elymus salinus	10.00	25.00	15.00	35.00	10.00	30.00	10.00	35.00	30.00	25.00
COVER										
Total Living Cover	20.00	30.00	30.00	40.00	25.00	30.00	20.00	45.00	35.00	35.00
Litter	10.00	5.00	10.00	10.00	10.00	15.00	5.00	20.00	20.00	10.00
Bareground	35.00	25.00	15.00	30.00	5.00	15.00	10.00	10.00	20.00	30.00
Rock	35.00	40.00	45.00	20.00	60.00	40.00	65.00	25.00	25.00	25.00
% COMPOSITION										
Shrubs	50.00	16.67	16.67	0.00	20.00	0.00	0.00	0.00	0.00	0.00
Forbs	0.00	0.00	33.33	12.50	40.00	0.00	50.00	22.22	14.29	28.57
Grasses	50.00	83.33	50.00	87.50	40.00	100.00	50.00	77.78	85.71	71.43

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25.00	0.00	8.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	40.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	40.00	10.00	20.00	25.00	5.00	20.00	20.00	35.00	0.00
35.00	45.00	20.00	25.00	35.00	45.00	20.00	20.00	35.00	30.00
25.00	15.00	20.00	10.00	15.00	40.00	15.00	25.00	20.00	20.00
5.00	10.00	20.00	40.00	35.00	10.00	30.00	30.00	25.00	5.00
35.00	30.00	40.00	25.00	15.00	5.00	35.00	25.00	20.00	45.00
71.43	11.11	40.00	20.00	28.57	88.89	0.00	0.00	0.00	100.00
14.29	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14.29	88.89	50.00	80.00	71.43	11.11	100.00	100.00	100.00	0.00

CO-OP MINE
Trail Canyon
PJ Reference Area
Exposure: E
Slope: 30 deg.
Sample Date: 22 July 1993

Mean	SDev	Freq	
			TREES & SHRUBS
0.10	0.44	5.00	Chrysothamnus nauseosus
2.80	5.79	30.00	Eriogonum corymbosum
0.25	1.09	5.00	Rosa woodsii
0.75	2.38	10.00	Ephedra viridis
2.00	8.72	5.00	Pinus edulis
1.50	6.54	5.00	Juniperus scopulorum
			FORBS
0.25	1.09	5.00	Aster foliaceus
1.00	2.55	15.00	Artemisia dracunculoides
0.25	1.09	5.00	Hymenoxys richardsonii
1.00	2.55	15.00	Erigeron engelmanii
0.85	2.39	15.00	Astragalus sp.
			GRASSES
20.25	11.45	90.00	Elymus salinus

		COVER
31.00	8.46	Total Living Cover
16.00	8.00	Litter
20.25	11.01	Bareground
32.75	14.10	Rock
		% COMPOSITION
23.17	30.55	Shrubs
11.26	15.25	Forbs
65.57	30.36	Grasses

CO-OP MINE
Trail Canyon
BTCA 3 - Upper Pad
Exposure: N
Slope: 0 - 3 deg

Sample Date: 15 Sept 1993	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
TREES & SHRUBS										
Chrysothamnus nauseosus	15.00	0.00	5.00	15.00	10.00	5.00	5.00	10.00	5.00	5.00
Ceratoides lanata	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS										
Linus lewsii	0.00	5.00	5.00	0.00	5.00	5.00	5.00	5.00	5.00	0.00
Melilotus officinalis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
Achillea millefolium	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	5.00
GRASSES										
Stipa hymenoides	0.00	20.00	5.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00
Agropyron dasystachyum	10.00	5.00	0.00	5.00	0.00	5.00	15.00	20.00	0.00	15.00
Agropyron spicatum	5.00	5.00	5.00	0.00	15.00	15.00	5.00	0.00	10.00	20.00
Elymus	0.00	5.00	5.00	0.00	5.00	5.00	0.00	5.00	0.00	0.00
COVER										
Total Living Cover	35.00	40.00	25.00	25.00	35.00	35.00	40.00	40.00	30.00	45.00
Litter	5.00	5.00	5.00	5.00	5.00	5.00	10.00	5.00	5.00	10.00
Bareground	25.00	45.00	10.00	20.00	30.00	30.00	45.00	35.00	40.00	20.00
Rock	35.00	10.00	60.00	50.00	30.00	30.00	5.00	20.00	25.00	25.00
% COMPOSITION										
Shrubs	57.14	0.00	20.00	60.00	28.57	14.29	12.50	25.00	16.67	11.11
Forbs	0.00	12.50	20.00	20.00	14.29	14.29	12.50	12.50	50.00	11.11
Grasses	42.86	87.50	60.00	20.00	57.14	71.43	75.00	62.50	33.33	77.78

CO-OP MINE
Trail Canyon
BTCA 3 - Upper Pad
Exposure: N
Slope: 0 - 3 deg
Sample Date: 15 Sept 1993

Mean	SDev	Freq	
			TREES & SHRUBS
7.50	4.61	90.00	Chrysothamnus nauseosus
0.50	1.50	10.00	Ceratoides lanata
			FORBS
3.50	2.29	70.00	Linus lewsii
1.00	3.00	10.00	Melilotus officinalis
1.00	2.00	20.00	Achillea millefolium
			GRASSES
3.50	6.34	30.00	Stipa hymenoides
7.50	6.80	70.00	Agropyron dasystachyum
8.00	6.40	80.00	Agropyron spicatum
2.50	2.50	50.00	Elymus

		COVER
35.00	6.32	Total Living Cover
6.00	2.00	Litter
30.00	10.95	Bareground
29.00	15.78	Rock
		% COMPOSITION
24.53	18.58	Shrubs
16.72	12.27	Forbs
58.75	20.08	Grasses

CO-OP MINE
Trial Canyon
BTCA 7 & 8
Spot Seeded Area Near Hwy 31
Exposure: S
Slope: 1 - 2 deg

1 thru 15 BTCA 7

Sample Date: 3 Sept 1993	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
TREES & SHRUBS										
Chrysothamnus nauseosus	10.00	5.00	25.00	35.00	15.00	25.00	30.00	25.00	20.00	20.00
Artemisia tridentata	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yucca harrimaniae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS										
Salsola iberica	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Opuntia polyacantha	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Penstemon sp.	5.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	7.00	0.00
Medicago sativa	5.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
Melilotus officinalis	0.00	0.00	0.00	5.00	5.00	0.00	5.00	10.00	8.00	10.00
Grindelia squarrosa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES										
Stipa comata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agropyron dasystachyum	0.00	0.00	0.00	0.00	5.00	5.00	0.00	0.00	0.00	0.00
Elymus cinereus	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agropyron spicatum	0.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bromus carinatus	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
Agropyron cristatum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00
COVER										
Total Living Cover	25.00	30.00	25.00	50.00	25.00	50.00	35.00	35.00	35.00	40.00
Litter	10.00	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	5.00
Bareground	40.00	40.00	35.00	30.00	45.00	15.00	35.00	25.00	25.00	40.00
Rock	25.00	25.00	30.00	10.00	20.00	25.00	20.00	30.00	30.00	15.00
% COMPOSITION										
Shrubs	40.00	33.33	100.00	70.00	60.00	50.00	85.71	71.43	57.14	50.00
Forbs	40.00	0.00	0.00	10.00	20.00	40.00	14.29	28.57	42.86	25.00
Grasses	20.00	66.67	0.00	20.00	20.00	10.00	0.00	0.00	0.00	25.00

16 thru 20 BTCR 8

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
20.00	35.00	15.00	10.00	35.00	15.00	5.00	5.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	5.00	0.00	10.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
0.00	15.00	15.00	15.00	0.00	20.00	20.00	10.00	10.00	30.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	5.00	0.00	5.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	10.00	20.00	15.00	20.00	10.00
35.00	50.00	35.00	35.00	50.00	50.00	50.00	45.00	40.00	40.00
5.00	25.00	10.00	15.00	10.00	25.00	10.00	5.00	25.00	15.00
35.00	15.00	40.00	20.00	25.00	5.00	35.00	40.00	15.00	30.00
25.00	10.00	15.00	30.00	15.00	20.00	5.00	10.00	20.00	15.00
57.14	70.00	42.86	28.57	70.00	40.00	10.00	33.33	0.00	0.00
14.29	0.00	14.29	28.57	0.00	0.00	0.00	11.11	12.50	0.00
28.57	30.00	42.86	42.86	30.00	60.00	90.00	55.56	87.50	100.00

CO-OP MINE
Trial Canyon
BTCA 7 & 8
Spot Seeded Area Near Hwy 31
Exposure: S
Slope: 1 - 2 deg
Sample Date: 3 Sept 1993

Mean	SDev	Freq	
			TREES & SHRUBS
17.50	11.12	90.00	Chrysothamnus nauseosus
0.25	1.09	5.00	Artemisia tridentata
0.75	2.38	10.00	Yucca harrimaniae
			FORBS
0.25	1.09	5.00	Salsola iberica
0.25	1.09	5.00	Opuntia polyacantha
1.10	2.74	10.00	Penstemon sp.
0.75	2.38	10.00	Medicago sativa
2.90	3.85	40.00	Melilotus officinalis
0.25	1.09	5.00	Grindelia squarrosa
			GRASSES
0.25	1.09	5.00	Stipa comata
0.50	2.18	5.00	Stipa hymenoides
7.25	8.87	50.00	Agropyron dasystachyum
0.25	1.09	5.00	Elymus cinereus
1.00	4.36	5.00	Agropyron spicatum
1.50	3.20	20.00	Bromus carinatus
4.25	6.94	30.00	Agropyron cristatum

		COVER
39.00	8.75	Total Living Cover
11.75	6.18	Litter
29.50	10.71	Bareground
19.75	7.50	Rock
		% COMPOSITION
48.48	25.94	Shrubs
15.07	14.39	Forbs
36.45	30.44	Grasses

CO-OP MINE
Trail Canyon
BTCA 9 - Reclaimed Slopes Near Homes
Exposure:
Slope:

Sample Date: 15 Sept 1993	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00
TREES & SHRUBS											
Chrysothamnus nauseosus	25.00	5.00	5.00	5.00	30.00	30.00	15.00	30.00	20.00	5.00	0.00
Artemisia tridentata	5.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS											
Penstemon palmeri	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kochia scoparia	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Achillea millefolium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES											
Elymus cinereus	0.00	0.00	0.00	0.00	10.00	10.00	0.00	0.00	0.00	0.00	0.00
Agropyron dasystachyum	10.00	0.00	5.00	15.00	20.00	5.00	15.00	0.00	10.00	10.00	25.00
Agropyron spicatum	5.00	20.00	20.00	10.00	0.00	10.00	15.00	30.00	20.00	15.00	25.00
Agropyron cristatum	0.00	15.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
COVER											
Total Living Cover	45.00	45.00	45.00	35.00	60.00	55.00	45.00	60.00	50.00	40.00	50.00
Litter	10.00	20.00	10.00	5.00	10.00	20.00	10.00	10.00	10.00	10.00	20.00
Bareground	25.00	25.00	35.00	50.00	10.00	15.00	20.00	20.00	20.00	25.00	20.00
Rock	20.00	10.00	10.00	10.00	20.00	10.00	25.00	10.00	20.00	25.00	10.00
% COMPOSITION											
Shrubs	66.67	11.11	33.33	14.29	50.00	54.55	33.33	50.00	40.00	12.50	0.00
Forbs	0.00	11.11	0.00	14.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grasses	33.33	77.78	66.67	71.43	50.00	45.45	66.67	50.00	60.00	87.50	100.00

CO-OP MINE
Trail Canyon
BTCA 9 - Reclaimed Slopes Near Homes
Exposure:
Slope:
Sample Date: 15 Sept 1993

12.00	13.00	14.00	15.00	Mean	SDev	Freq	
							TREES & SHRUBS
10.00	5.00	10.00	15.00	14.00	10.20	93.33	Chrysothamnus nauseosus
0.00	0.00	0.00	0.00	1.00	2.71	20.00	Artemisia tridentata
							FORBS
0.00	0.00	0.00	0.00	0.33	1.25	6.67	Penstemon palmeri
0.00	0.00	0.00	0.00	0.33	1.25	6.67	Kochia scoparia
0.00	0.00	5.00	0.00	0.33	1.25	6.67	Achillea millefolium
							GRASSES
0.00	0.00	10.00	0.00	2.00	4.00	20.00	Elymus cinereus
20.00	20.00	25.00	0.00	12.00	8.52	80.00	Agropyron dasystachyum
10.00	15.00	0.00	45.00	16.00	11.28	86.67	Agropyron spicatum
0.00	0.00	0.00	0.00	2.00	4.40	20.00	Agropyron cristatum
							COVER
40.00	40.00	50.00	60.00	48.00	7.70		Total Living Cover
25.00	10.00	10.00	20.00	13.33	5.68		Litter
15.00	25.00	20.00	15.00	22.67	9.29		Bareground
20.00	25.00	20.00	5.00	16.00	6.63		Rock
							% COMPOSITION
25.00	12.50	20.00	25.00	29.89	18.50		Shrubs
0.00	0.00	10.00	0.00	2.36	4.79		Forbs
75.00	87.50	70.00	75.00	67.76	17.16		Grasses

CO-OP MINE
Trail Canyon
Reclaimed Pond Drainage Area
(Previously "Slopes")
Exposure:
Slope:

Sample Date: 15 Sept 1993	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
TREES & SHRUBS										
Artemisia tridentata	5.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus nauseosus	15.00	10.00	5.00	5.00	2.00	10.00	10.00	5.00	10.00	0.00
FORBS										
Penstemon palmeri	0.00	5.00	3.00	5.00	5.00	0.00	0.00	0.00	0.00	0.00
Artemisia dracunculus	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kochia scoparia	0.00	0.00	0.00	20.00	5.00	0.00	0.00	0.00	0.00	0.00
Sanquisorba minor	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Melilotus officinalis	0.00	0.00	0.00	5.00	5.00	0.00	0.00	0.00	0.00	5.00
GRASSES										
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agropyron cristatum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	25.00	0.00
Agropyron spicatum	25.00	10.00	5.00	5.00	5.00	0.00	0.00	5.00	5.00	5.00
Agropyron dasystachyum	0.00	0.00	25.00	5.00	5.00	5.00	35.00	25.00	10.00	20.00
Elymus salinus	0.00	0.00	0.00	0.00	5.00	10.00	0.00	0.00	0.00	0.00
Elymus cinereus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00	5.00
COVER										
Total Living Cover	45.00	25.00	45.00	45.00	35.00	25.00	45.00	55.00	50.00	35.00
Litter	15.00	15.00	25.00	5.00	15.00	15.00	15.00	10.00	10.00	15.00
Bareground	15.00	30.00	15.00	20.00	20.00	25.00	30.00	10.00	15.00	35.00
Rock	25.00	30.00	15.00	30.00	30.00	35.00	10.00	25.00	25.00	15.00
% COMPOSITION										
Shrubs	44.44	40.00	11.11	11.11	14.29	40.00	22.22	9.09	20.00	0.00
Forbs	0.00	20.00	22.22	66.67	42.86	0.00	0.00	0.00	0.00	14.29
Grasses	55.56	40.00	66.67	22.22	42.86	60.00	77.78	90.91	80.00	85.71

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00
0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00
10.00	5.00	10.00	5.00	10.00	10.00	15.00	5.00	5.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	20.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
5.00	20.00	0.00	0.00	10.00	35.00	5.00	25.00	15.00	30.00	20.00	5.00	25.00
15.00	5.00	25.00	25.00	25.00	5.00	5.00	0.00	5.00	5.00	25.00	15.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
30.00	35.00	35.00	40.00	50.00	50.00	25.00	40.00	30.00	40.00	45.00	40.00	45.00
5.00	10.00	10.00	15.00	10.00	10.00	5.00	5.00	5.00	15.00	20.00	10.00	25.00
40.00	25.00	30.00	20.00	10.00	15.00	25.00	30.00	25.00	15.00	20.00	25.00	15.00
25.00	30.00	25.00	25.00	30.00	25.00	45.00	25.00	40.00	30.00	15.00	25.00	15.00
33.33	14.29	28.57	37.50	20.00	20.00	60.00	12.50	16.67	7.50	0.00	0.00	0.00
0.00	14.29	0.00	0.00	0.00	0.00	0.00	0.00	16.67	5.00	0.00	0.00	0.00
66.67	71.43	71.43	62.50	80.00	80.00	40.00	87.50	66.67	87.50	100.00	100.00	100.00

CO-OP MINE
Trail Canyon
Reclaimed Pond Drainage Area
(Previously "Slopes")
Exposure:
Slope:
Sample Date: 15 Sept 1993

24.00	25.00	Mean	SDev	Freq	
					TREES & SHRUBS
0.00	0.00	0.84	2.24	16.00	Artemisia tricentata
10.00	0.00	6.28	4.66	76.00	Chrysothamnus nauseosus
					FORBS
0.00	0.00	0.80	1.70	20.00	Penstemon palmeri
0.00	0.00	0.20	0.98	4.00	Artemisia dracunculus
0.00	0.00	1.00	4.00	8.00	Kochia scoparia
0.00	0.00	0.48	1.39	12.00	Sanquisorba minor
0.00	0.00	0.60	1.62	12.00	Melilotus officinalis
					GRASSES
0.00	0.00	1.40	4.36	12.00	Stipa hymenoides
0.00	0.00	1.60	5.24	12.00	Agropyron cristatum
15.00	15.00	11.60	10.07	84.00	Agropyron spicatum
15.00	5.00	12.20	10.30	84.00	Agropyron dasystachyum
0.00	0.00	0.60	2.15	8.00	Elymus salinus
0.00	25.00	2.20	5.84	16.00	Elymus cinereus
					COVER
40.00	45.00	39.80	8.18		Total Living Cover
15.00	25.00	13.00	6.00		Litter
30.00	20.00	22.71	7.63		Bareground
15.00	10.00	24.80	8.54		Rock
					% COMPOSITION
25.00	0.00	19.50	15.68		Shrubs
0.00	0.00	8.08	15.82		Forbs
75.00	100.00	72.42	20.35		Grasses

CO-OP MINE
Residential Exclusion Area
PJ Reclaimed Area
Exposure: S
Slope: 7 deg.

Sample Date: 22 July 1993	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
TREES & SHRUBS										
Chrysothamnus nauseosus	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Rosa woodsii	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gutierrezia sarothrae	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
Pinus ponderosa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
FORBS										
Convolvulus arvensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aster foliaceus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
Astragalus cicer	5.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	25.00	25.00
Melilotus officinalis	5.00	5.00	5.00	5.00	0.00	0.00	0.00	5.00	0.00	0.00
Erigeron sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Medicago sativa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
GRASSES										
Elymus salinus	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Elymus hispidus	20.00	10.00	10.00	5.00	10.00	10.00	30.00	15.00	15.00	5.00
Dactylis glomerata	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bromus carinatus	0.00	0.00	5.00	20.00	10.00	30.00	0.00	5.00	0.00	0.00
COVER										
Total Living Cover	35.00	20.00	30.00	35.00	30.00	40.00	35.00	35.00	45.00	35.00
Litter	35.00	5.00	40.00	5.00	40.00	40.00	35.00	25.00	15.00	10.00
Bareground	25.00	45.00	10.00	40.00	25.00	15.00	20.00	30.00	25.00	20.00
Rock	5.00	30.00	20.00	20.00	5.00	5.00	10.00	10.00	15.00	35.00
% COMPOSITION										
Shrubs	0.00	25.00	0.00	0.00	33.33	0.00	14.29	0.00	11.11	0.00
Forbs	28.57	25.00	50.00	14.29	0.00	0.00	0.00	42.86	55.56	85.71
Grasses	71.43	50.00	50.00	85.71	66.67	100.00	85.71	57.14	33.33	14.29

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.00	20.00	5.00	15.00	5.00	25.00	40.00	35.00	25.00	25.00
0.00	0.00	10.00	5.00	10.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	10.00	5.00	10.00	10.00	0.00	10.00	5.00	10.00
50.00	40.00	35.00	40.00	30.00	35.00	40.00	45.00	30.00	40.00
25.00	25.00	35.00	40.00	35.00	40.00	30.00	40.00	35.00	30.00
20.00	30.00	15.00	15.00	25.00	20.00	20.00	10.00	15.00	25.00
5.00	5.00	15.00	5.00	10.00	5.00	10.00	5.00	20.00	5.00
0.00	12.50	0.00	37.50	0.00	0.00	0.00	0.00	0.00	0.00
60.00	37.50	28.57	0.00	16.67	0.00	0.00	0.00	0.00	12.50
40.00	50.00	71.43	62.50	83.33	100.00	100.00	100.00	100.00	87.50

CO-OP MINE
Residential Exclusion Area
PJ Reclaimed Area
Exposure: S
Slope: 7 deg.
Sample Date: 22 July 1993

Mean	SDev	Freq	
			TREES & SHRUBS
0.75	2.38	5.00	Chrysothamnus nauseosus
0.25	1.09	5.00	Rosa woodsii
1.00	2.55	15.00	Gutierrezia sarothrae
0.25	1.09	15.00	Pinus ponderosa
			FORBS
0.25	1.09	5.00	Convolvulus arvensis
0.50	2.18	5.00	Aster foliaceus
5.25	9.55	30.00	Astragalus cicer
2.00	2.92	35.00	Melilotus officinalis
0.25	1.09	5.00	Erigeron sp.
0.25	1.09	5.00	Medicago sativa
			GRASSES
0.25	1.09	5.00	Elymus salinus
17.25	10.06	100.00	Elymus hispidus
1.50	3.20	20.00	Dactylis glomerata
6.50	7.60	55.00	Bromus carinatus
			COVER
36.25	6.50		Total Living Cover
29.25	11.54		Litter
22.50	8.73		Bareground
12.00	8.72		Rock
			% COMPOSITION
6.69	11.69		Shrubs
22.86	24.72		Forbs
70.45	24.76		Grasses

APPENDIX E
ANNUAL IMPOUNDMENT CERTIFICATION

1993 ANNUAL IMPOUNDMENT CERTIFICATION REPORT

Name of Permittee: Co-Op Mining Company
Permit No.: ACT/015/025
Mine Name: Bear Canyon Mine

Water Impoundment Identification: Sediment Pond "A"
Inspection Date: 12-18-93

I, or persons under my supervision have conducted adequate inspections of the maintenance of the structure in accordance with the approved plan and have noted the following during observations made at this time.

ITEM		REMARKS
(1)	**Appearance;**	No appearance of instability, sructural weakness or other hazardous condition was noted.
(2)	**Slope Stability:**	Slopes appear stable. Outer slopes are vegetated.
(3)	**Erosion:**	No erosion evident.
(4)	**Construction and Maintenance**	Construction and maintenance are in accordance with the approved plan. Quarterly inspections have been made and reports submitted to the Division in accordance with the approved plan.

1993 ANNUAL IMPOUNDMENT CERTIFICATION REPORT

Name of Permittee: Co-Op Mining Company
Permit No.: ACT/015/025
Mine Name: Bear Canyon Mine

Water Impoundment Identification: Sediment Pond "B"
Inspection Date: 12-18-93'

I, or persons under my supervision have conducted adequate inspections of the maintenance of the structure in accordance with the approved plan and have noted the following during observations made at this time.

ITEM		REMARKS
(1)	**Appearance;**	No appearance of instability, sructural weakness or other hazardous condition was noted.
(2)	**Slope Stability:**	Slopes appear stable. Outer slopes are vegetated.
(3)	**Erosion:**	No erosion evident.
(4)	**Construction and Maintenance**	Construction and maintenance are in accordance with the approved plan. Quarterly inspections have been made and reports submitted to the Division in accordance with the approved plan.

1993 ANNUAL IMPOUNDMENT CERTIFICATION REPORT cont.

(5)	**Present Water Depth;**	0.1 feet ±
	Present Sediment Level ;	7062.2 ft
	Sediment Cleanout Level;	7062.9 ft (60 percent cleanout level)
	Existing Storage Capacity;	0.39 acre-feet
	Required Storage Capacity by Approved Plan;	0.185 acre-feet
	Comments:	Pond frozen.
(6)	**U.P.D.E.S. Requirements; UTG040006, Utah General Permit for Coal Mining. Discharge Point 002.**	Discharge monitoring is conducted monthly and reports are submitted to the Division and Utah Department of health as required in the approved plan. No discharge was noted in 1993.
(7)	**Recommendations/Comments**	Pond capacity is adequate based on sediment level and "As-built measurements. Sediment cleanout is recommended within the next six months.

Based on this field inspection of Sediment Pond "B", I do hearby certify that the above information is a true and accurate representation of the pond at this time.

Kimly C Mangum
name

3/18/94
date

REGISTERED PROFESSIONAL ENGINEER
No. 7900
KIMLY C. MANGUM
STATE OF UTAH

1993 ANNUAL IMPOUNDMENT CERTIFICATION REPORT

Name of Permittee: Co-Op Mining Company
Permit No.: ACT/015/025
Mine Name: Bear Canyon Mine

Water Impoundment Identification: Sediment Pond "C"
Inspection Date: 12-18-93'

I, or persons under my supervision have conducted adequate inspections of the maintenance of the structure in accordance with the approved plan and have noted the following during observations made at this time.

ITEM		REMARKS
(1)	**Appearance;**	No appearance of instability, sructural weakness or other hazardous condition was noted.
(2)	**Slope Stability:**	Slopes appear stable. Outer slopes are vegetated.
(3)	**Erosion:**	No erosion evident.
(4)	**Construction and Maintenance**	Construction and maintenance are in accordance with the approved plan. Quarterly inspections have been made and reports submitted to the Division in accordance with the approved plan.

1993 ANNUAL IMPOUNDMENT CERTIFICATION REPORT cont.

(5)	**Present Water Depth;**	Dry
	Present Sediment Level ;	7026 ft
	Sediment Cleanout Level;	7030.3 ft (60 percent cleanout level)
	Existing Storage Capacity;	0.36 acre-feet
	Required Storage Capacity by Approved Plan;	0.195 acre-feet
	Comments:	Dry
(6)	**U.P.D.E.S. Requirements; UTG040006, Utah General Permit for Coal Mining. Discharge Point 002.**	Discharge monitoring is conducted monthly and reports are submitted to the Division and Utah Department of health as required in the approved plan. No discharge was noted in 1993.
(7)	**Recommendations/Comments**	Pond capacity is adequate based on sediment level and "As-built measurements. Sediment cleanout is recommended within the next six months.

Based on this field inspection of Sediment Pond "C", I do hearby certify that the above information is a true and accurate representation of the pond at this time.

Kimly C Mangum
name

3/18/94
date

REGISTERED PROFESSIONAL ENGINEER
No. 7900
KIMLY C. MANGUM
STATE OF UTAH

1993 ANNUAL IMPOUNDMENT CERTIFICATION REPORT

Name of Permittee: Co-Op Mining Company
Permit No.: ACT/015/021
Mine Name: Trail Canyon Mine

Water Impoundment Identification: Trail Canyon Sediment Pond
Inspection Date: 12-18-93'

I, or persons under my supervision have conducted adequate inspections of the maintenance of the structure in accordance with the approved plan and have noted the following during observations made at this time.

ITEM		REMARKS
(1)	**Appearance;**	No appearance of instability, sructural weakness or other hazardous condition was noted.
(2)	**Slope Stability:**	Slopes appear stable. Outer slopes are vegetated.
(3)	**Erosion:**	No erosion evident.
(4)	**Construction and Maintenance**	Construction and maintenance are in accordance with the approved plan. Quarterly inspections have been made and reports submitted to the Division in accordance with the approved plan.

1993 ANNUAL IMPOUNDMENT CERTIFICATION REPORT cont.

(5)	**Present Water Depth;**	Dry
	Present Sediment Level ;	~~92.7~~ ft ~~(elev.~~ 6943.8~~ft~~
	Sediment Cleanout Level;	~~93.1 ft (elev~~ 6944.15~~ft~~ (60 percent cleanout level)
	Existing Storage Capacity;	1.84 acre-feet
	Required Storage Capacity by Approved Plan;	1.082 acre-feet
	Comments:	Based on bottom at 89.0 ft (elev. 6940.5) Pond frozen. Runoff entering pond.
(6)	**U.P.D.E.S. Requirements; UTG040006, Utah General Permit for Coal Mining. Discharge Point 002.**	Discharge monitoring is conducted monthly and reports are submitted to the Division and Utah Department of health as required in the approved plan. No discharge was noted in 1993.
(7)	**Recommendations/Comments**	Pond capacity is adequate based on sediment level and approved sediment pond map Plate 7-2.

Based on this field inspection of the Trail Canyon Sediment Pond, I do hearby certify that the above information is a true and accurate representation of the pond at this time.

Kimly C. Mangum
name

3/18/94
date

REGISTERED PROFESSIONAL ENGINEER
No. 7900
KIMLY C. MANGUM
STATE OF UTAH

APPENDIX F
ANNUAL REPORT OF OFFICERS

STATE OF UTAH
DEPARTMENT OF COMMERCE
DIVISION OF CORPORATIONS AND COMMERCIAL CODE

PROFIT CORPORATION ANNUAL REPORT

The following information is on file in this office. All profit corporations must file their annual reports and corrections within the month of their anniversary date. Failure to do so will result in dissolution of the corporate charter.

THIS BOX MUST BE COMPLETED

CORPORATE NAME, REGISTERED AGENT, REGISTERED OFFICE, CITY, STATE & ZIP

CORPORATION # 104145
D 05/10/83
C. W. MINING COMPANY
CARL E. KINGSTON
53 WEST ANGELO AVE
SALT LAKE CITY, UT 84115

MAKE ALL CORRECTIONS IN THIS COLUMN

(Print New Agent Name) (Signature)

(New Registered Office)

(New City) REGISTERED AGENT MUST BE IN UTAH UTAH (Zip)

5. INCORPORATED IN THE STATE AND UNDER THE LAWS OF: UTAH

ADDRESS OF THE PRINCIPAL OFFICE IN THE HOME STATE.

(Street Address) (State or Country)

(City) (Zip)

BUSINESS PURPOSE: BITUMINOUS COAL & LIGNITE(SURFACE)

OFFICERS

PRESIDENT B.W. STODDARD
ADDRESS P.O. BOX 300
CITY, STATE & ZIP HUNTINGTON, UT. 84528
VICE PRESIDENT J.A. GUSTAFSON
ADDRESS 1815 SOUTH 1100 WEST
CITY, STATE & ZIP WOODS CROSS, UT. 84087
10. SECRETARY R.L. BROWN
ADDRESS 53 WEST ANGELO AVE
CITY, STATE & ZIP SALT LAKE CITY, UT 84115
11. TREASURER R.L. BROWN
ADDRESS 53 WEST ANGELO AVE
CITY, STATE & ZIP SALT LAKE CITY, UT 84115

8.
9.
10. D. J. Sanders
53 West Angelo Avenue
Salt Lake City, Utah 84115
11. D. J. Sanders
53 West Angelo Avenue
Salt Lake City, Utah 84115

1993 JUN 18 PM 4:06
RECEIVED
DIVISION OF CORPORATIONS
STATE OF UTAH

DIRECTORS

12. DIRECTOR B.W. STODDARD
ADDRESS P.O. BOX 300
CITY, STATE & ZIP HUNTINGTON, UT. 84528
13. DIRECTOR J.A. GUSTAFSON
ADDRESS 1815 SOUTH 1100 WEST
CITY, STATE & ZIP WOODS CROSS, UT. 84087
14. DIRECTOR R.L. BROWN
ADDRESS 53 WEST ANGELO AVE
CITY, STATE & ZIP SALT LAKE CITY, UT 84115

(If you have less than 3 shareholders you may list less than 3 directors.)

12.
13.
14. D. J. Sanders
53 West Angelo Avenue
Salt Lake City, Utah 84115

3-16-93 UPDATE

Under penalties of perjury and as an authorized officer, I declare that this annual report and, if applicable, the statement change of registered office and/or agent, has been examined by me and is, to the best of my knowledge and belief, true, correct, and complete.

15. BY B W Stoddard (Signature of Authorized Corporate Officer)
16. President (Title or Position)
17. June 17 (Date) 1993

IF THERE ARE NO CHANGES FROM THE PREVIOUS YEAR, PLEASE DETACH THE COUPON BELOW AND RETURN IT IN THE ENCLOSED ENVELOPE WITH YOUR PAYMENT. YOU MAY KEEP THE ABOVE REPORT FOR YOUR RECORDS

FORM NDEZ31